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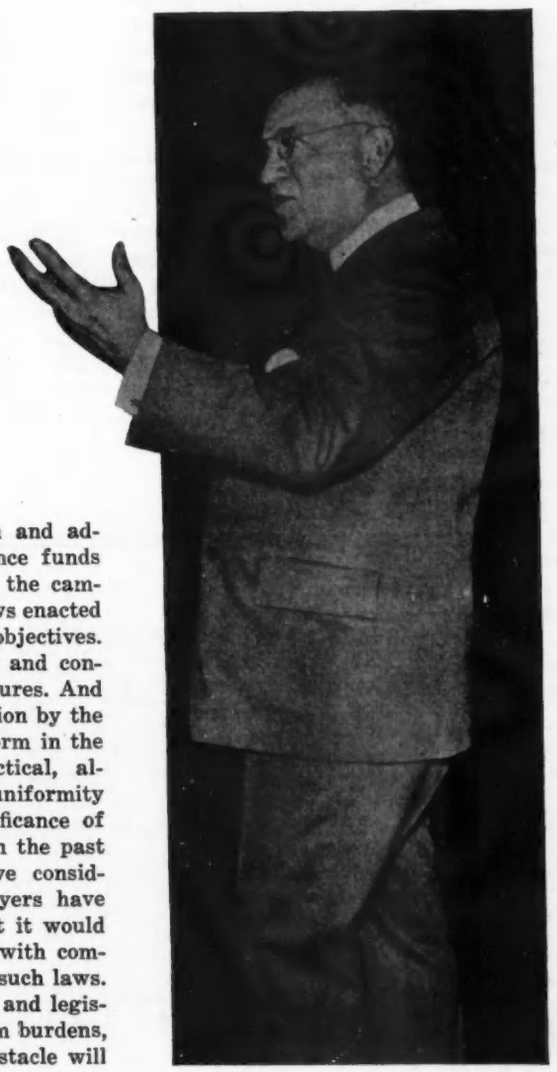
Unemployment Reserve Legislation Looms

Eight States have commissions studying the proposal as Washington moves for early action on this and other forms of social insurance by State Legislatures

by Don Blanchard
Editor, Automotive Industries

Senator Wagner of New York who says passage of his bill will bring a concerted drive for State unemployment reserve laws



Courtesy, Phila. *Public Ledger*

UNEMPLOYMENT reserve, old-age pension and perhaps other forms of social insurance are coming if the present administration can put them into effect. They are part and parcel of the new deal and, so far as the administration is concerned, the question is not should we have such insurance, but what is the best way to provide it.

Moreover, if Washington has its way, the necessary laws will be put on the books quickly. It is felt there, and probably rightly so, that it will be easier to get action now while the public is experiencing the hardships of unemployment and is sympathetic to any steps intended to mitigate them, than it will be later when returning prosperity makes unemployment a poignant memory rather than the harsh reality it is today. In a sense therefore in striving for early enactment of social insurance measures, Washington is running a race with recovery.

Realizing that the creation and administration of social insurance funds are properly state functions, the campaign to get the necessary laws enacted is being directed toward two objectives. First it seeks to get prompt and concerted action in State legislatures. And second, it seeks to get legislation by the States that is as nearly uniform in the burdens it imposes as practical, although perhaps lacking in uniformity in other respects. The significance of the second objective is that in the past where individual States have considered social insurance, employers have fought it on the ground that it would put them at a disadvantage with competitors in States not having such laws. By securing concerted action and legislation imposing fairly uniform burdens, it is felt that this serious obstacle will be surmounted.

The Wagner unemployment reserve bill now before Congress is a part of this double-barreled campaign. While there is no certainty that it will pass at this session, since it is not officially an administration measure, it has rather powerful backing. Its sponsor, Senator Wagner, stands high in administration esteem. Labor Secretary Perkins has endorsed it. The President as yet has not expressed an opinion on it, but there is little reason to doubt that he is thoroughly in sympathy with its objectives, if not with all its details. Back when he was Governor of New York, Mr. Roosevelt prophesied that "We are coming to unemployment insurance in this country just as certainly as we have come to workmen's compensation." It is believed that the President still holds this opinion.

The National Labor Conference held recently in Washington at Miss Perkins' call was another part of the campaign for social insurance. This conference was attended by representatives of governors of 44 states. In addition to endorsing the Wagner bill, the Conference adopted an outline of a uniform code of social legislation to be pressed for early action in State legislatures. This code covered among other things, child labor standards, a maximum work-week of 40 hrs., and old-age pensions beginning at 60 to 65 years.

These are not the only evidences of the liveness of the social insurance issue, particularly unemployment reserves, at the present time. The New York Times reports that unemployment reserve legislation was introduced in 25 States last year and that bills passed one house of the legislature in eight States. Commissions have been appointed to study the question in eight States, while the State of Washington may hold a referendum on it. Enactment of laws in New York and Massachusetts this year, is regarded as more than as a possibility. Mention might also be made of the fact that Congress has authorized the House Labor Committee to investigate old-age pensions. It is quite possible too that that Committee will embody the Deane plan, of which more later, in legislation to be offered as an alternative to the Wagner proposal.

Business Will Have to Foot the Bill

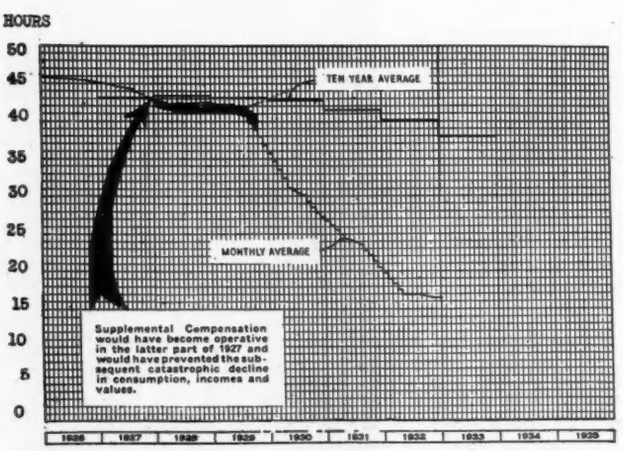
With all this activity, in less exciting and eventful times, unemployment reserves would be a dominant topic but, with so many pressing problems crying for solution, it has received scant attention from business. This apparent indifference, of course, is understandable under the circumstances. Nevertheless, since business will have to foot the bill for this and other forms of social insurance that are in the offing, it is vital that it interest and inform itself so that when legislation is enacted, it will impose the least burden consistent with its objectives.

Reverting to the Wagner bill, H. R. 7659 (being a revenue measure it was first introduced in the House by Representative Lewis of Maryland), it is frankly designed to encourage—some say bribe or coerce—the States to enact unemployment reserve laws within the next year. It would levy a five per cent Federal excise tax on all wages and other compensation paid to employees who do not receive a fixed salary of $250 or more per month. This tax would be assessed on the payrolls of all employers of more than 10 persons for 20 or more weeks in a year, except governmental agencies and employers of agricultural laborers, domestic workers, teachers, family workers and the like.

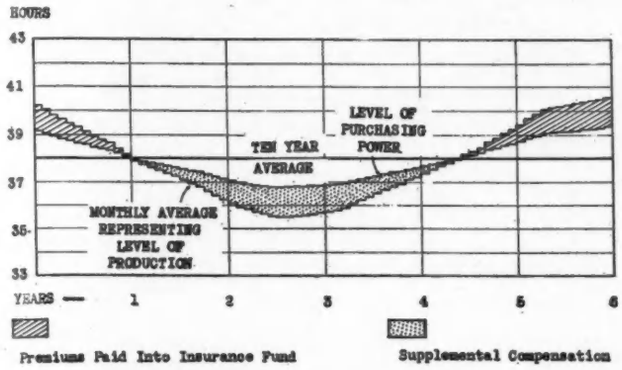
It is not intended, however, that the Federal Treasury will ever get much of this tax. For the bill provides, in the words of Senator Wagner, that "Each employer will be allowed a set-off against his Federal tax equal to the amount that he contributes to unemployment insurance or reserves established under State law. Since inhabitants of the several States will prefer keeping their money at home rather than contributing it to the Federal Government, there will be a concerted drive for the enactment of the State laws." In other words, the only money the tax will actually bring into the Federal Treasury will be what is left after contributions to State funds have been deducted from the five per cent levy. Although this balance, if any, will go into Uncle Sam's general fund, it might be regarded as an offset against his relief expenditures.

Certainly there is no reason to doubt that Senator Wagner is right in his expectation that passage of his bill would result in a rush by the States to get under the wire with unemployment reserve bills before the excise tax goes into effect on July 1, 1935. In fact, the rush probably would be as precipitate as the dash to repeal prohibition.

To make sure that none of the states chisel under what Washington considers to be a proper unemployment reserve law, the Wagner bill provides that employers may deduct their contributions to the state fund from the Federal tax *only* where the State law establishing the fund has been certified by the United States Secretary of



The solid black area indicates how, Mr. Deane says, consuming power (demand) would have been raised above current production (supply), if proposal had been in operation. The increasing excess of consuming power would have forced production back to the TEN YEAR AVERAGE, as indicated by the dotted line



The Effect on the Deane Plan on Purchasing Power in a Depression

While deflationary forces responsible for a downward trend of production and employment may be sufficiently strong, no matter how induced, to sustain themselves for a period, it will be noted that the deeper the deflation goes the stronger the pull of demand (represented by basic income plus Supplemental Compensation), on inducing supply (represented by current production), to increase. And, it is inescapable that, at some point, the trend will be reversed and, further, that the continuing excess of demand over supply will force the current production level above the TEN YEAR AVERAGE, at which time premiums will refund the Supplemental Compensation used to induce such return.

Labor as meeting the minimum requirements set up for such laws in the Wagner bill. In other words, no certification, no credits; so it is safe to assume that law passed by the States would meet the minimums.

The minimums which the Wagner bill would require are too numerous to detail here. Among other things, they require weekly benefits of not less than $7 or average earnings for 20 hrs. of work, and these benefits must be paid for at least 10 weeks. Moreover, otherwise eligible employees must not be denied benefits for refusing to take a job open because of a strike or lockout, a job at sub-standard pay or working conditions, or a job conditioned on the worker's joining a company union or which would interfere with his belonging to or joining any bona fide labor organization. The Wagner bill puts no limitations on the type of funds. Hence they might be State-wide, industrial pools, or individual employer reserves. Nor does the bill concern itself with the sources of the fund; the State law consequently might call for contributions from employers, from workers, or from both. However, only employer contribution would be deductible from the Federal tax.

Although some of the ballyhoo of the Wagner bill described it, if not as a cure, at least as a major palliative for depression, its possible accomplishments in this direction are opened to question. In fact, this tendency to oversell the possibilities of unemployment reserves is one of the grave dangers in the movement since it may lead to unnecessary disappointment. Calm consideration of the benefits proposed in the Wagner and other unemployment reserve proposals leads to the conclusion that the most that such insurance can accomplish is to relieve the hardships of seasonal unemployment. The possibility of its exercising any important corrective effect on the business cycle when a major downward movement is under way, does not appear too good.

In addition to mitigating seasonal hardships, the bill would also put additional pressure on employers to flatten their employment curves. In describing this aspect of his bill, Senator Wagner says "A novel feature of the bill is that an employer will be allowed an extra set-off when he has succeeded in reducing his State contributions through increasing the steadiness of employment in his business. Thus there is provided an additional stimulus to industrial continuity." This extra set-off, however, may not be taken unless the State fund has met all its obligations during the year. The objective of this feature of the bill obviously is the same as the form of dismissal wage proposed by labor at the hearings on the NACC and APEM codes.

Unemployment Not An Insurable Risk

Although the word "actuarial" is bandied about a good bit in Washington discussion of unemployment reserves, apparently very little if any actuarial work has been done. The five per cent tax figure in the Wagner bill is admittedly a bargaining figure, apparently inserted in the bill on the theory that any figure was better than no figure. At least it puts the burden of proof that it is not correct on those who disagree with it—not a scientific attitude, but a practical one.

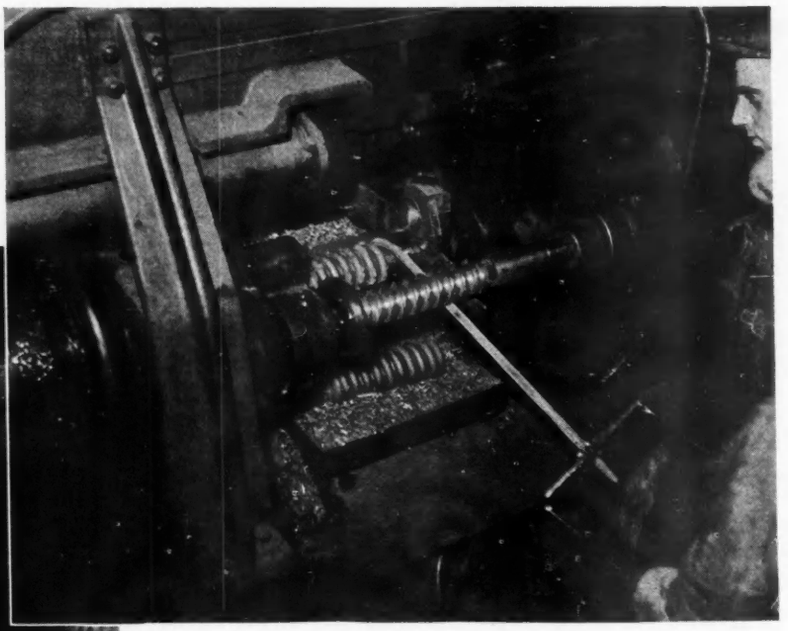
As a matter of fact, students of insurance say that the possibilities of actuarial methods in unemployment reserve insurance, are distinctly limited. Very likely actuaries can predict seasonal unemployment with suitable accuracy and to the extent that unemployment reserves are intended to meet the seasonal problem, it is perhaps not unsolvable. But forecasting cyclical unemployment is something else again as it resolves itself into forecasting the course of the business cycle. No reliable method of making such predictions has yet been developed. To demonstrate the difficulties of this form of prophecy it is necessary only to ask who in 1929 would have been rash enough to predict the depth and duration of the present depression? Of course, it may be contended that with unemployment reserves the depression would not have been either as long or as deep. Maybe $7 a week for 10 weeks paid to each worker who lost his job would have turned the tide, but the contention is at least open to doubt.

No forecasting is involved in the Deane plan, mentioned earlier, except perhaps indirectly in the establishment of its basis of operation. This plan, described as one for eliminating unemployment, is of peculiar interest to the automotive industry because its author, A. L. Deane, is president of General Motors Holding Corp. It is based on the belief that ". . . along with the elimination of unemployment through just distribution of available work, must go some automatic means of increasing purchasing power in relation to current production whenever, for any reason whatever, production falls below the total desire for the articles produced." Mr. Deane has been advocating his plan for several years but the interest it aroused among the members of the House Labor Committee has put it in the spotlight.

Under the Deane plan, all employed persons receiving less than $60 per week, and all persons registering for employment, with the exception of agricultural and personal service workers, are defined as eligible. At the end of each year, average weekly hours of employment would be determined for the preceding 10 years, and at the end of each month for the preceding month. All hours worked by an eligible in a week in excess of the 10-year or

(Turn to page 272, please)

Fig. 1 (Right)—Coiling springs for Chevrolet knee action assemblies. The lead screw revolves at the same speed as the arbor. Note the rolls above the arbor ends for closing the last coil of the spring. Present equipment provides a capacity of 6000 springs every 24 hrs.



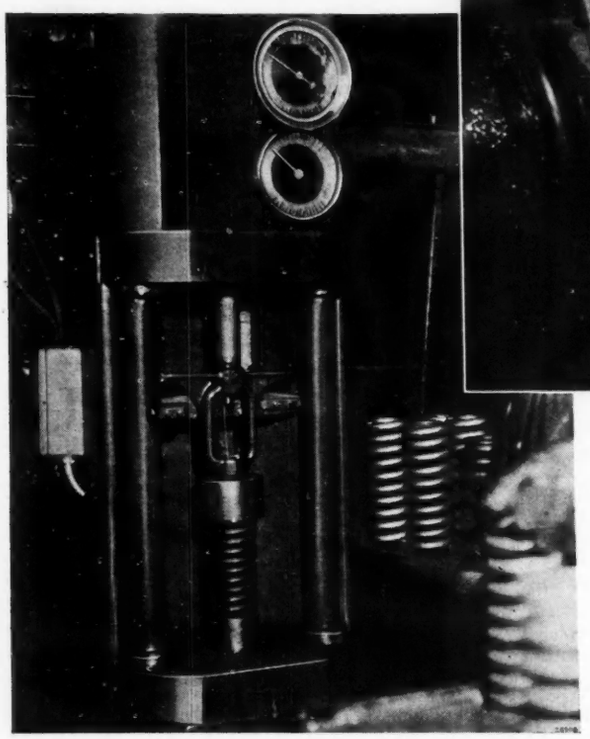


Fig. 2—Compressor testing of semi-finished Chevrolet coil springs

How Chevrolet

A sketch of the manufacture of the front suspension units which are now being built at the rate of 3825 daily

PRODUCTION of Chevrolet knee action assemblies at the Chevrolet Gear and Axle plant in Detroit has now reached the rate of 170 sets an hour, with the lines operating on a 22½ hr. daily basis, giving a total of 3825 front ends daily. Thus the production of these units is now actually exceeding car production.

Raising production to this point has naturally involved purchase of considerable amounts of new tool and handling equipment, etc., along with the development of an entirely new art in the manufacture of front assemblies.

While there is nothing new about coil springs, those used in knee-action suspensions have to be held to tolerances closer and are stressed higher, requiring higher grades of materials, than have heretofore been used. As a matter of fact at the time of its adoption, at least, by Chevrolet, there was probably no single source in the country from which the needed springs could have been purchased.

The Chevrolet springs have the following specifications:

Tensile strength	190,000 lbs.
Elastic limit	175,000 to 190,000 lbs.
Carbon	.55-.60
Manganese	.80
Phosphorus	.040 max.
Sulphur	.050 max.
Silicon	1.80-2.20 per cent

Material is purchased in hot-rolled round bars sized to .7035 in. by a single cold roll. The first operation is centerless grinding by which the diameter of the 'wire' is reduced to .6875 in. plus or minus .002 in.. The bars are cut to 93½ in. lengths previous to this operation, each rod forming a single coil spring.

Following grinding, rods are inspected for surface imperfections which might start an eventual fatigue failure.

Next the ends of the rods are heated and then taper rolled to provide clearance for the closing of the end coil. This operation is performed on a special point-rolling machine.

The rods are now ready for coiling, and are fed through a pusher type furnace in which they are brought to a temperature of 1600 deg. As they leave the furnace they are fed into special coiling machines arranged in batteries of four at the exit of the furnace.

As the bars enter the machine, jaws grip the tapered point and draw it around a revolving arbor. In front of the arbor (Fig. 1) is the lead screw to guide the rod dur-

ing the coiling operation. A heavily loaded roller presses the end coil against the second coil as the rolling operation is completed. The arbor is withdrawn from the machine by a hydraulic mechanism, the spring drops through and the arbor returns to the starting position.

Next the coil springs are laid in separate cradles on an endless chain conveyor which passes through the first heat-treating furnace. Here the springs are heated again to 1600 deg. F. Emerging from this furnace they are mounted on fixtures which hold the spring to its proper length, and clamp it to maintain its shape and dimensions while quenching the spring in 12-sided oil quenching machines.

From here the coils are subjected to a second heat-treat to relieve quenching strains, being heated to 950 deg. F., and then quenched in water. The spring is now completed.

Springs are then tested with 30 applications of a 5000 lb. load. Sizing and cleaning the spring complete the production operations. Ends are ground flat in 16 station grinders, through which they pass twice, reducing finished coil height to 9 11/16 in. Ends are held to within .005 in. for parallel. Cleaning of springs is with shot-blast equipment. All springs are Brinelled for hardness within limits.

Following are major specifications of the finished spring:

Free length	9 11/16 in.
Tolerance	.005 in. for parallel
Wire diameter	.6875 in.
Tolerance	.002 in. plus or minus
Coils per spring	10½ to 11
Springs rate	1520 lbs. per inch
Normal spring length, curb height of car.	8 in.
Load per spring, curb.	2620 lbs.
Leverage ratios from wheel to spring	3.52 to one
Permissible spring travel	1 15/16 in. max.
Equivalent to wheel travel of	6.8 in.

It will be remembered that the action of the main spring in the Chevrolet suspension is modified and limited by a take-up spring inside the main spring. This spring which comes into action with large wheel deflections and prevents bottoming of the main spring has the same material specifications and is produced in the same manner as the main spring. It has the following specifications:

Number of coils	4
Free height	1 27/32 in.
Fully compressed	1 17/32 in.

Makes Its Knees

by Athel F. Denham
Detroit Editor, Automotive Industries

Fig. 3—Chevrolet suspension housings are composed of two steel stampings butt-welded together. Bearing bosses, steering knuckles, are also assembled to the housing by welding

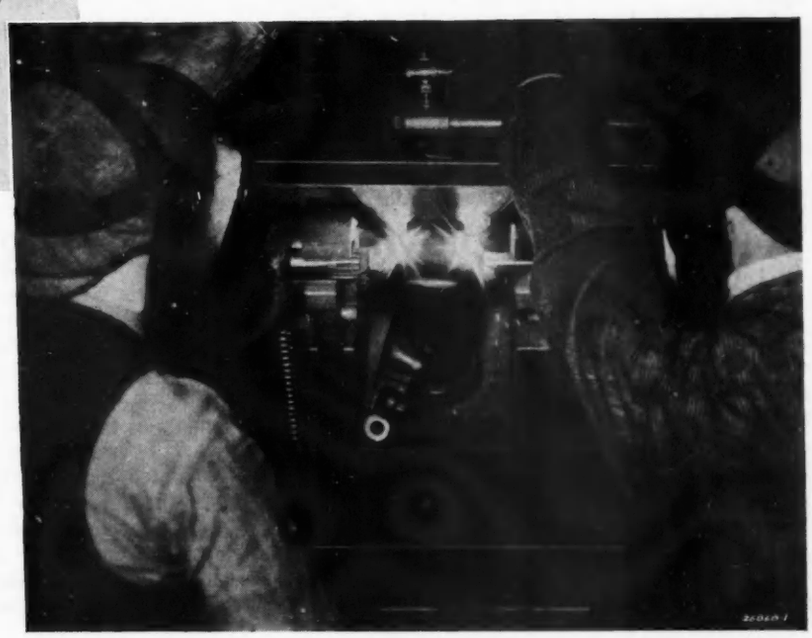


Fig. 4—In welding bearing bosses to the suspension housing, the former are held and spaced on the welder shaft which turns one revolution during the annular welding operation

Fig. 5—Final assembly check of Chevrolet suspension housings. The weight at the left duplicates weight on the spring in the car. Additional compression is provided hydraulically by the cylinder as shown below the fixture at the right. The operator is shown adjusting the initial spring compression to produce the correct final loaded car height as shown by the pointer near the left end of the bar

Compressed fully at load of ..... 2000 lbs.
Spring rate ..... 5300 lbs. per inch
Uncoiled length of rod 17 in.
Wire diameter ..... .4375 in.
Coil, inside diameter. 1.09 in.

Another interesting manufacturing set-up is to be found for the production of the suspension housings containing the coil springs. These are composed of two low carbon steel stampings 5/32 in. thick, shown ready for welding in Fig. 3.

The two halves are first butt-welded together in a battery of four special electric welders in which the sections are securely clamped and held firmly together under hydraulic pressure. Following this operation there is an immediate test of the weld under air pressure, for leaks.

Next, the upper or open end of the housing is threaded to receive the cover. Next the steering knuckle forging is welded to the rectangular projection shown on the housing wall. Following this the support arm shaft bearing bosses are welded into the housing walls. This is also performed on an electric welder of special design shown in Fig. 4. Bosses are aligned and spaced on the welder shaft which rotates through a complete revolution progressively completing an annular weld to the housing wall surrounding the bosses.

Housings are then heat-treated to relieve welding strains before boring and reaming the bearing bores in the bosses. Following the latter operation the 'forward' face (at right rear in figure) of the housing is finished to provide a seat for the flanges of the two shock absorber cylinders.

The steering knuckle forging is finished by an extrusion process, one of the heaviest extruding operations performed in high production in the industry. This unit with its companion king-pin support yoke are of chrome nickel steel. The requirements for satisfactory welding to the suspension housing demand unusual accuracy in the finishing of these parts, which brought about the development of the extruding process.

The operation is performed hot in a vertical press equipped with dies to hold the assembly to proper outside dimensions. The descending punch under hydraulic pressure causes the hot metal to flow upward between the dies and the punch forming the welding flanges. A shoulder on the punch limits the height of the extruded flange, excess metal being pressed outward between this shoulder and the dies, where it can be subsequently trimmed off. Heat-treatment follows this operation before welding.

Bearing bores in the suspension housing are roller burnished to provide a smooth seat for the needle bearings used in the assembly.

Unemployment Reserve Legislation Looms

(Continued from page 269)

monthly average, whichever is lower, would be considered overtime and for such overtime employers would be required to pay double-time. The eligible employee would get time and a half for his overtime while the other half would go into a national insurance fund. When the monthly average is below the 10-year average, employed eligibles receive one-half their basic hourly rates for each hour of difference between these averages, the money coming from the national insurance fund. All eligibles unable to find work would be given employment under a permanent civil works program. They would be paid an hourly rate estimated at one-half the current hourly wage for similar types of work, the necessary money to come out of the national insurance fund. Some of the effects of the plan, as Mr. Deane foresees them, are shown in the accompanying charts. (Pages 268, 269.)

It is hoped that the foregoing discussion will not be construed as a call to arms to fight social insurance. On the contrary, *Automotive Industries* believes that automotive employers are as sympathetic to the objectives of such proposals as any other group. The only purpose of this article is to stimulate their interest in this important social and economic matter.

JUST AMONG OURSELVES

Time for Action On Gas Tax

REPEAL of the bank check tax has been recommended by the Ways and Means Committee bill now under consideration by Congress, but we don't see any mention of reduction in motor vehicle taxes.

Despite the obvious difficulties in the way of getting action on motor taxes, it does seem as though renewed action, particularly on the part of dealers and car owners, might still have positive effects. Involved as they are in attempts to settle various details of code interpretation and application, automobile dealers have given less attention to legislative and tax matters than on similar occasions in the past, while care owners have become engrossed in many other elements of legislative movements.

There may still be time for effective action.

* * *

Salaries and Responsibility

FOUR or five years ago, William Dutton came into our office and asked: "What can you tell me about the salaries drawn by executives of automobile companies? I am writing an article for the *Saturday Evening Post* discussing the old idea of how much an executive may be worth and comparing in a general way the salaries paid in different important industries."

Dutton wrote his article, but had to do a lot of digging for facts. Today his fact-finding job would be easy. The Federal Trade Commission has furnished the facts. But the question of how much an executive may be worth isn't any nearer being answered than it was then—and it won't be when the August solons of the Senate finish fooling with the figures. Men who operate vast enterprises are called upon to make hundreds of decisions each year, any one of which may mean a difference of millions of dollars in profits or losses. Only the arrogant or the ignorant will pretend to gage within narrow limits the value of having those decisions made correctly.

That chief executives should continue to draw five and seven figure salaries or bonuses when their efforts result in wage cuts, losses for the company and lack of dividends, on the other hand, may well be viewed askance by all those concerned. Executive leadership must carry with it responsibility for failure as well as for success. Too frequently, it has been willing to claim the rewards of success and share the responsibility for failure.

Publication of executive salaries for perusal of the uninformed and inevitably-envious masses, however, can do little but harm in a period when, due to gross misdeeds of a few, industrial executives in general will find it difficult to get the public confidence necessary to the rebuilding of American business on a sound basis.

Physics Rather Than Economics

OTHER things being equal, it is normal to expect that the more money people have the more automobiles they will buy. It usually does work out that way, in fact.

Traffic congestion is one of the things that isn't equal in various cities, however, and there is plenty of evidence that this can influence automobile sales more strongly than buying power alone. Paul G. Hoffman, Studebaker Sales Corp., president, was talking about this the other day. "It has long been my contention," he said, "that the so-called saturation point of automobile ownership in any large city is controlled by physics, rather than by economics." Then he pulled out the following figures, provided by Miller McClintock of the Erskine Bureau for Traffic Research at Harvard University:

	Annual per Capita Spending Income	Number of Persons per Passenger Car
Boston	$630.4	7
Chicago	550.4	8
Cleveland	429.5	5
Detroit	337.9	6
Indianapolis ..	396.9	4
Los Angeles ..	523.8	3
Pittsburgh	440.8	8
St. Louis	409.4	5
S. Francisco ..	565.7	4
Washington ..	658.9	3

It's easy to see that the number of automobiles per person doesn't vary directly with the per capita income.

Knowledge of average driving and traffic conditions in the various cities mentioned indicates that the number of cars per person does seem to vary rather directly with the ease of getting about by car in the particular towns. Boston, for example, is notoriously a more difficult city in which to operate a car conveniently than is Washington.

The figures are interesting to think about at any rate, while the topic is general might well have the serious attention of the whole industry.—N. G. S.

INDEPENDENT WHEEL SU

A comprehensive report of Maurice Olley's S. A. E. Annual Meeting Paper on this important subject

THE paper on independent suspensions presented by Maurice Olley of Cadillac at the recent S.A.E. Annual Meeting aroused so much interest and contained such a wealth of valuable information that we are presenting herewith a more extended report of it than it was possible to give in the decidedly sketchy resume which appeared in our issue of February 3.

A common objection to a direct attack on the springing problem, Mr. Olley said, has been that "riding quality" is something intangible, something not directly measurable, and even a matter of personal preference and opinion. His answer was that the same objection might be raised in relation to appearance, yet few would deny that the appearance of cars had been greatly improved in recent years.

Two types of instrument proved very useful in the study of suspension systems, namely, a bouncing table and a simple instrument showing the component frequencies of car oscillation. The bouncing table, as developed at General Motors Proving Grounds, is a table or seat which can be given a simple harmonic motion in the vertical direction, amplitude and frequency of the motion being adjustable at will. The "subject" is seated on this device, the stroke or amplitude is set at any desired value, and the frequency is gradually increased until the subject says he is beginning to feel uncomfortable. By repeating the test at several different stroke settings and with a large number of subjects, a "curve of comfort" (evidently an "amplitude-maximum tolerable frequency curve"), is obtained, which is fundamental, and Mr. Olley pointed out that differences between the results of tests with different individuals were sufficiently small to show that riding comfort is not a matter of opinion to any extent.

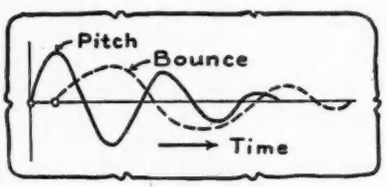


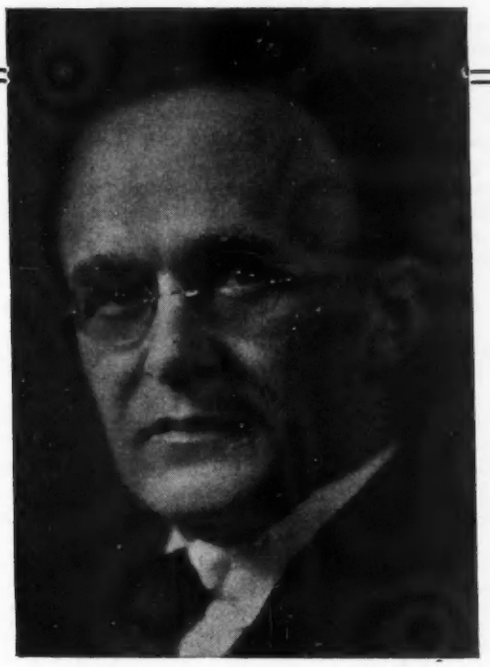
Fig. 1—Curves of pitch and bounce with front springs stiffer than rear

A few words may be devoted here in further explanation of the three ranges of frequency involved in car oscillation, mentioned by Mr. Olley in his paper, and in the abstract which appeared in AUTOMOTIVE INDUSTRIES of February 3. The first range, 60-150 cycles per min., will be immediately recognized as that of the spring-supported mass oscillating on the chassis springs. The second range, 250-350 cycles per minute, is that of the body, chassis, axle and wheels, acting as a rigid unit (owing to the friction between spring leaves and members of the shock absorber) oscillating on the pneumatic tires. Mr. Olley pointed out that this frequency is especially pronounced if the friction in the chassis suspension system is great. The third range, 400-600 cycles per minute, is due to the unsprung mass oscillating on the tires. The frequency of these latter oscillations is not constant but dependent on the amplitude. If the unsprung weight oscillated alone on the tires, the frequency evidently would be independent of the amplitude, as in the case of a weight supported by a spring; but the pressure between tire and road is varied by the oscillations of the sprung weight, with the result that the effective elastic force of the tire varies from cycle to cycle of vibration of the unsprung mass, whose frequency is quite high when the pressure between tire and road is high, and is greatly lowered when the tire leaves the road during a bounce.

Shock absorbers normally are adjusted to properly damp the action of the chassis springs (the first range of frequencies). Oscillation within the second range of frequencies (the whole sprung and unsprung mass oscillating as a rigid unit) is limited as to amplitude by friction in the springs and dampers, and the spring friction and shock-absorber friction therefore must be kept low in order to render these oscillations unobjectionable. Oscillations within the third range of frequencies, Mr. Olley observed, can be fully damped, provided the frame itself and the shock absorbers and their connections are rigid enough so that there is no possibility of resonance with oscillations of the unsprung masses.

In discussing suspension problems and riding qualities, the spring rate is a factor that is frequently referred to, but Mr. Olley pointed out that a factor more directly indicative of riding quality is the compression of the spring under normal load. Measuring this compression directly does not give satisfactory results, however, because the "rate" varies from point to point of deflection, and so far as the boulevard ride is concerned, what counts is the "rate" around the point of normal deflection. This would seem to make it necessary to get the "deflection under normal load" from the rate of the spring, but it has been found that determining the rate on the free spring gives results which do not agree with those obtained on the road, because both the clamping action of the clips securing it to the front axle and the angle of the shackle links have their effects on this factor.

SUSPENSIONS



Maurice Olley, engineer of the Cadillac Motor Car Co.

"The only test of spring rate which we have found even approximately reliable," Mr. Olley said, "is to mount the complete car on four platform scales and pull it down to the normal load position with the wheels resting on the scales. This is done by special jacks bolted to T slots in the floor, the jacks being arranged to both push and pull. By then pulling the car down and pushing it up again through a range of 3 or 4 in. to both sides of the normal load position, and measuring distances from the scale platform to a mark on each fender, we obtain a true load-deflection diagram for the suspension as a whole, including the tires. At the same time we get a loop representing static friction in the suspension. The tire effect can easily be eliminated by simple calculation from the tire rate at normal load."

This same arrangement permits of determining the rate of the suspension system in rolling, by pushing up on one side of the car and pulling down on the other.

The author cited the equation for the frequency of oscillation of a simple spring-supported mass, according to which the frequency depends only on the deflection under normal load. By applying this equation to the front and rear ends of the car, using the deflections of front and rear springs under normal load, we obtain theoretical values for the frequencies of the front and rear end respectively. Actually, the spring-suspended mass does not oscillate in a straight line parrallel with the direction of spring force, as assumed in the frequency formula quoted. Ordinarily there is oscillation around two transverse axes. One of these two forms of oscillation, known as pitching, is around an axis located somewhere between the rear axle and the center of gravity of the car, and the other, known as bouncing, around a transverse axis located ahead of the front axle. The frequency of such angular oscillations depends on the moment of inertia of the oscillating body around the axis of oscillation and on the restoring moment, that is, the product of the spring force into its distance from the axis. Mr. Olley stated that these actual frequencies are always higher than those calculated for the front and rear ends by means of the equation for the frequency of oscillation of a simple spring-supported mass. For instance, for a car in which the normal deflection of the front springs is 4 in. and that of the rear springs 9 in., the front-end frequency figures out to 94 cycles per minute and the rear-end frequency to 63, while the true frequencies of pitch and bounce (principally front and rear-end oscillation respectively) were determined to be 110 and 70 cycles per minute. In view of the fact that the comfort factor is very sensitive to frequency, this deviation from the theoretical frequency calls for an increase in the deflection under normal load over what would be adequate if the theoretical frequencies were obtained.

The positions of the two axes of oscillation are important not only because of their effect on the frequency but also because they determine the sort of "action" the car will have (which is undoubtedly dependent upon the direction of the interaction between the car seat and the passenger's body).

Mr. Olley enumerated some of the characteristics of these angular oscillatory motions. Whatever the disturbance of the motion of the car as a whole, the angular motion around each axis of oscillation is a simple harmonic motion. Adding load at one of the axes of oscillation has no effect on the frequency of oscillation around that axis, but lowers the frequency around the other axis. For instance, removal of the front bumper will not affect the frequency of bounce, but will lower the frequency of the pitching motion. Normally both oscillatory

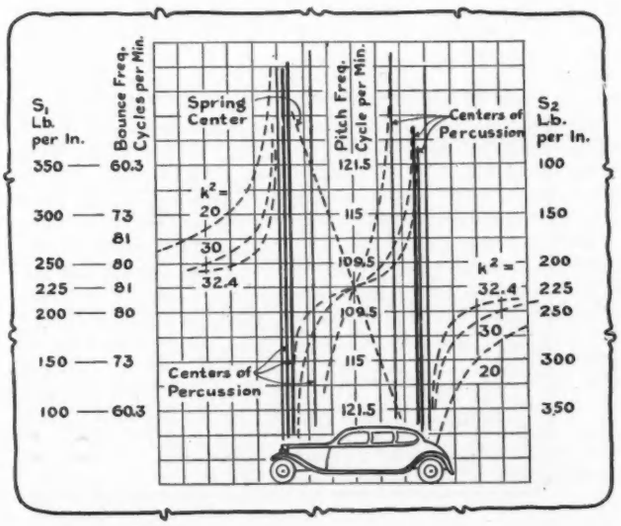


Fig. 2—Shift of axes of oscillation with a change in the relative stiffnesses of front and rear springs

Wheelbase, 12 ft.; sprung weight, 4830 lb.; mass units, 150; a and b, 6 ft. each.

motions are present simultaneously. To produce one of them alone, the exciting force must be applied at the axis of the other.

Pitch is excited primarily by shock to the front wheels, bounce by shock to the rear wheels. As the same road obstacles generally strike the front and rear wheels in succession, the phase relations of pitch and bounce at the beginning are as shown in Fig. 1. This same Figure indicates that, as mentioned by Mr. Olley in his talk, the pitch frequency is usually 50 to 60 per cent higher than the frequency of bounce. Any particular road obstacle starts pitch first, and then bounce. The pitching motion is the most rapid, the front end of the car dropping while the rear is rising, and vice versa, and Mr. Olley considers this a particular objection to the conventional springing system.

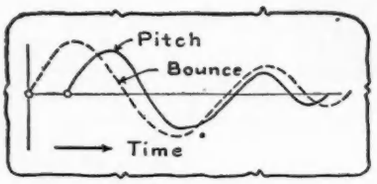


Fig. 3—Curves of pitch and bounce with rear springs stiffer than front

Now assume that the front springs are softened. The effects are that both axes of oscillation move forward, the axis of pitch slowly, the axis of bounce more rapidly; the frequency of pitch is decreased rapidly, that of bounce more slowly. The boulevard ride improves immediately, providing damping and frictional effects in the front suspension are reduced at the same time, but the rear of the car tends to "throw" more at high speeds. If the front springs are further softened, and their deflection under normal load approaches that of the rear springs, the pitching action subsides; in other words, the ride tends to "level out." Fig. 2 shows how the oscillation centers are shifted when the front springs are softened and the rear springs simultaneously stiffened. The chart also shows the effect of the k^2/ab ratio in causing these centers to "cling" to the axle (front or rear) for the axis of bounce, and to the opposite center of percussion for the axis of pitch, as the ratio is increased.

With the deflections of front and rear springs under normal load equal, the axis of bounce is at an infinite distance. With the bounce a straight up and down motion (corresponding to motion around an axis at an infinite distance), the motion of any high point in the car, such as the head of an occupant, must be a simple harmonic motion, devoid of so-called interference kicks. At the higher speeds the tendency is particularly toward straight up and down motion, and in addition to the improvement in the ride resulting therefrom, there is a further improvement due to the fact that the ratio of pitch to bounce frequency is a minimum.

While the condition of equal front and rear deflections thus has certain advantages, it does not give the best results in practice. Blows at either end of the car, instead of producing either simple pitch or simple bounce, produce a substantially equal combination of both. A road wave will react equally on both the front and the rear wheels, and under certain conditions at low road speeds a slow pitching action is developed, which, however, can be controlled within reasonable limits by a quite soft shock-absorber setting.

If the front springs are made softer than the rear springs, impacts on the front wheels produce bounce, and impacts on the rear wheels pitch. While some factors of the ride are getting worse, the motion stirred up by the front end is getting slower than that stirred up by the rear (Fig. 3). On passing over an obstacle, the car still tends to swing to a level position and holds it until the oscillation has nearly died out. There is a range in the value of the ratio "rear-spring deflection/front-spring deflection" below that of unity for which the car appears to have substantially a simple up and down motion. If the front springs are made still softer, a point is eventually reached where the front end appears to move over the road without vertical movement, while the rear end kicks all by itself.

From his study of the problem Mr. Olley reached the conclusion that the front-spring deflection should be equal to or somewhat greater than the rear-spring deflection, and that in cars in which the passenger load causes considerable variation in rear-end deflection, the springs should be so chosen that front and rear-end deflections are equal only at maximum load.

An important factor in connection with the problem of riding quality is the ratio k^2/ab, where k is the radius of gyration of the sprung mass and a and b are the distances from the center of gravity to the axes of the front and rear wheels, or the two parts into which the center of gravity divides the wheelbase. Evidently, the greater this factor, the larger the angular momentum (or flywheel effect) of the sprung mass. It has been generally considered that an optimum ride is obtained if k^2/ab is equal to 1, and this holds for the conventional form of springing, with which both frequencies would be reduced by from 10 to 20 per cent if the condition mentioned obtained. But simply making k^2/ab equal to unity without changing the springing does not get rid of the vertical interference kicks, from which the driver (at the middle of the car) suffers most, and of horizontal interference kicks at the passenger's heads. Under the condition mentioned,

$$\frac{\text{Pitch frequency}}{\text{Bounce frequency}} = \sqrt{\frac{\text{rear deflection}}{\text{front deflection}}}$$

For the case previously considered, of a car with front and rear deflections of 4 and 9 in. respectively, this gives a pitch frequency 50 per cent higher than the bounce frequency, and with such a large difference in the frequencies there will be still quite severe interference kicks. The idea suggested itself of combining equal front and rear deflections with a weight distribution making k^2 equal to ab. This also was tried, and the ride appeared to be rather pleasant but difficult to control. To make k^2 equal to ab it is necessary to move weight out well to the front and rear, and the rather peculiar appearance of a large car with this weight distribution did not seem to be justified by the slight difference in the riding qualities as compared with the condition $k^2/ab = 0.75$.

When the rear deflection under normal load is equal to the front deflection,

$$\frac{\text{Pitch frequency}}{\text{Bounce frequency}} = \sqrt{\frac{ab}{k^2}},$$

so that if $k^2/ab = 0.75$, the ratio is 1.15+, that is, the pitch frequency is about 15 per cent greater than the bounce frequency, as compared with 50 per cent in the previous example. Mr. Olley said the difference on the road between a car in which the

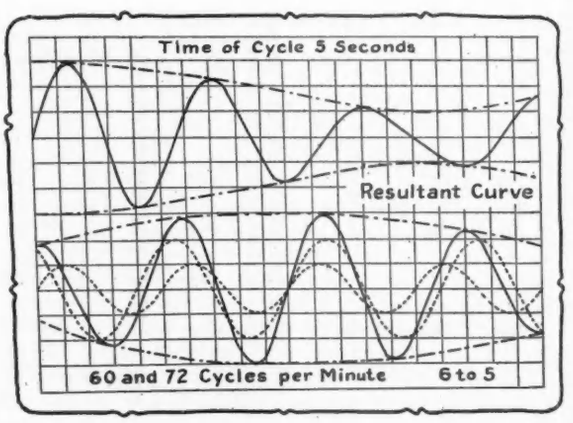


Fig. 4—Resultant of two simple harmonic motions, one of half the amplitude of and 20 per cent greater frequency than the other

pitching and bouncing frequencies are equal and one in which the former is 15 per cent higher than the latter is so slight that with one's eyes closed it is difficult to detect which of the two conditions obtains.

With the relatively high damping effects which must be present in a motor car suspension to hold it on the road, it is difficult to distinguish the "beat note" produced by two frequencies differing in frequency by 15 per cent. For example, Fig. 4 shows the resultant of two simple harmonic motions, one half the amplitude of the other, of which the one of smaller amplitude has a frequency 20 per cent greater than that of the other.

The first ride tests were made on a seven-passenger sedan, which type was chosen because of its considerable overhang at the rear. Outriggers were fitted to the car at front and rear, and twelve 60-lb. cast-iron weights were placed in a box in the rear compartment or clamped to the outriggers, as desired (Fig. 5). The outriggers were at equal distances from the box, so that if a pair of weights were removed from the box and clamped to the front and rear outriggers respectively, the location of the center of gravity, and therefore the division of load between front and rear springs, was not

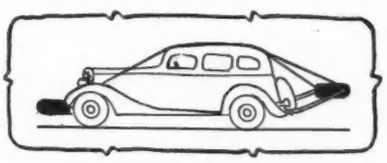


Fig. 5—Sketch of test car with outriggers at front and rear designed to take weights by means of which the radius of gyration k and, therefore, the moment of inertia can be changed without changing the weight

changed, while the moment of inertia was increased. Each outrigger could hold all twelve weights. In this way the whole range of possibilities in regard to weight distribution, moment of inertia, and front and rear spring deflections could be rapidly explored, and the results obtained checked by repetition.

Investigation having shown that front and rear-spring deflections should be equal, while with conventional suspension systems the rear-spring deflection is from 2½ to 3 times as great as that of the front, the question arose whether the desired condition could be brought about by softening the front and simultaneously stiffening the rear springs. It was found that whether it is permissible to stiffen the rear springs depends very much on the location of the rear passengers relative to them. With conventional springing the rear passengers suffer discomfort particularly from the action of the front springs, but when the front springs

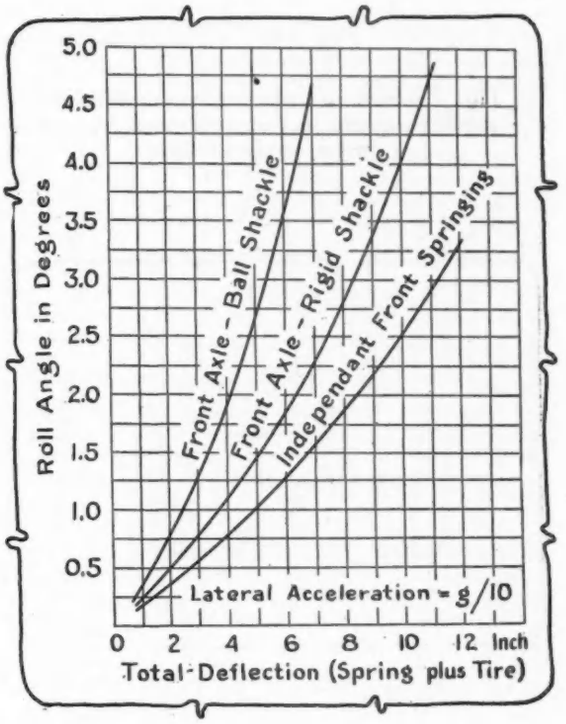


Fig. 6—Dependence of roll on turns of spring connection between chassis and wheel axle and on total deflection (spring plus tire)

are materially softened the rear-seat ride becomes more and more dependent on the rear springs, for which reason they cannot be stiffened. So the front springs must be brought up to the softness of the rear springs; in other words, their deflection under normal load must be made from 2½ to 3 times as great as in conventional springing systems.

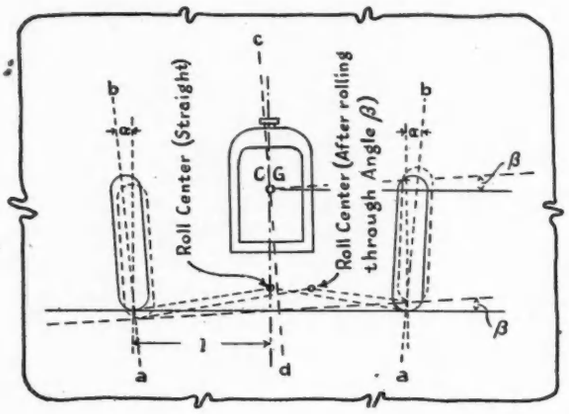
Among the advantages of independent springing over the conventional form mentioned by Mr. Olley is that it lessens the roll at turns. This roll, so far as it is affected by spring action, is caused by centrifugal force acting at the center of gravity of the sprung mass, and is dependent upon the height of the center of gravity above the points of spring support (the lever arm) and on the spring base or the center distance between springs on opposite sides of the car. With independent springing of the parallel-action type the spring rate is effective at the center of the wheel, and the spring base therefore is greater, which tends to decrease the roll; in fact the roll varies inversely as the square of the spring base. On the other hand, the lever arm also is greater. Roll at turns, however, is not solely dependent on the springs; the axle itself rolls considerably on its tires, and the shift of the center of gravity when the car is rolling produces a cumulative effect which must be taken into consideration.

Some figures were cited of the relative rolls with (1) conventional springs connected to the chassis frame by spherical (torsionally-free) shackles; (2) with conventional springs connected to the frame by the usual stiff shackles; and (3) with a parallel-action independent-suspension system without any device tending to modify the roll. (See Fig. 6.) With stiff springs the roll angles were found to be in the proportion 2.00:-1.33:1.00, while with springs giving a deflection of 7 in. under normal load the roll angles were in the proportion 3.1:1.5:1.0. Thus with springs having a deflection of 7 in. under normal load, the parallel-action independent springing has an advantage of 50 per cent with respect to roll over the conventional springing system with stiff shackles.

The reason for emphasizing "parallel-action" in this case is that independent suspensions may be built without parallel action, in which case some tire scrub takes place. This is actually so on the Cadillac, and it makes an important difference in the stability on corners. In Fig. 7, the tire contact points are supposed to move outwardly along line *a-b* as the wheels rise, making a small angle α with the vertical. The first effect is that the roll center is raised by an amount $l\,\alpha$, as shown, l being one-half the width of track. This was pointed out by Maruhn in his 1932 book on *Federung von Automobilen.* A second effect, which is not yet fully understood, is that as the car rolls, the center moves over, so that the cumulative effect due to the shift of the center of gravity apparently is compensated for, or reversed.

The question naturally arises, "If there is less roll with independent springing than with conventional suspensions, why are torsion stabilizers used with the former system?" Mr. Olley answers that the increase of about 50 per cent in the overall softness of the suspension increases the roll angle about 75 per cent, and it

Fig. 7—Shift of rolling center with independent springing, accompanied by outward scrub of tire



is the greater softness of the suspension, and not the fact that independent springing is used, that calls for the use of torsion stabilizers.

When making a turn at speed, the wheels do not progress in the direction of their planes but at a slight angle thereto, called the slip angle. When making a turn of 800 ft. radius with a car of 10-ft. wheelbase at a speed of 60 m.p.h., the slip angle is about 4 deg. for both front and rear wheels. Lateral slipping of the wheels on the road engenders side thrust on the wheel, which supplies the centrepetal force necessary to push the car round the turn. The thrust is proportional to the slip angle (up to about 5 deg.), and increases with tire pressure and tire size, but is independent of speed and wheel load. The important fact in connection with this side thrust is that its resultant does not pass through the center of the contact patch on the road, but 1 in. or more back of that point, so that it produces a "self-righting" effect on the front wheels. While the side thrust is independent of wheel load, the self-straightening torque about the knuckle-pin axis increases directly with the wheel load. On the outside wheel of a large car it will reach 1500-1600 lb.-in., which is not far from the effort required to swing the front wheels around in parking. This is the greatest force the driver has to work against in holding the car into a turn, and the greatest single force tending to straighten the car out after a turn.

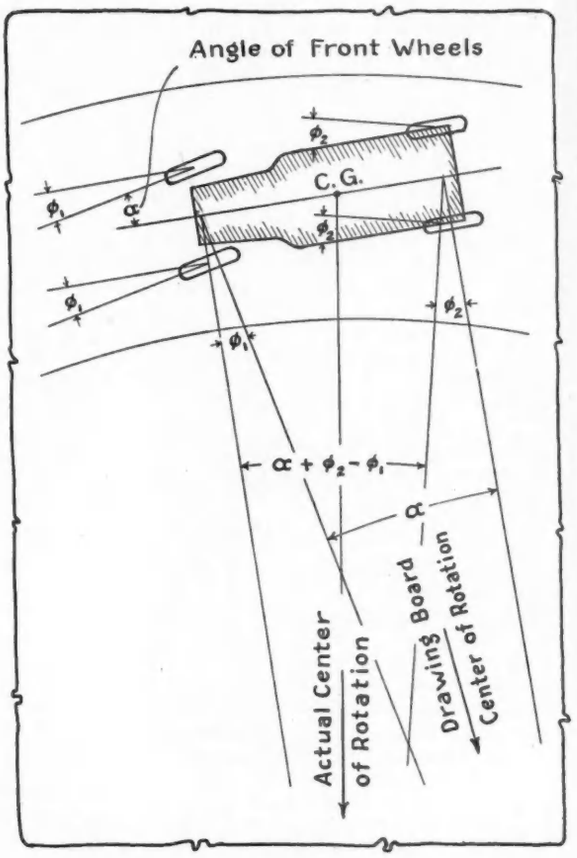
With a car having independent springing of the parallel-action type, there is another force tending to hold the front wheels in the straight-ahead direction, and Mr. Olley has furnished us the sketches Figs. 8 and 9 to explain how this side-thrust effect occurs. His explanation follows:

"On the left is shown a wheel square with the road, developing a side thrust due to slip angle. This is obviously due to a distortion of the rubber somewhat as shown by the curved line inside the contact patch. The successive parts of the tire coming into contact with the road account for the line being bulged out more back of the center, thereby producing a 'self-straightening' torque around the king pin.

"The thrust due to camber is shown on the right. One might expect this to be a simple component of the rolling resistance, in which case, the rolling resistance being, say, 1¼ lb. per 100 lb. of load, the camber thrust would be 1¼/57.3 = 0.022 lb. per 100 lb. per deg. Actually it is about sixty times as big as this, or equal to the rolling resistance. It is applied a bit ahead of the center, so that it also tends to straighten out the wheels.

"Now, looking at Fig. 9, which shows a car going around a turn, it is obvious that R, the radius of

Fig. 9—Showing position of car with respect to turning axis when making turns at high speed

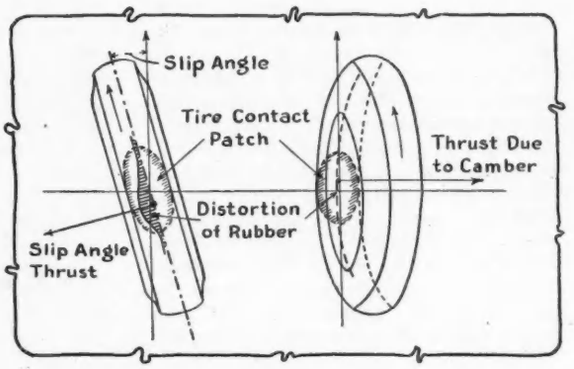


$$R = \begin{matrix}\text{Actual turning radius (to center of gravity of car).}\end{matrix} \qquad R \sim \frac{l}{\alpha + \phi_2 - \phi_1} \text{ (approx.)}$$

$$R = \frac{l}{2 \sin \alpha} \sqrt{\sin^2 \alpha + 4 \cos \alpha \cos\phi \cos(\phi - \alpha)}$$

(accurate if $\phi_1 = \phi_2$)

Fig. 8—Diagram illustrating slip-angle thrust and camber thrust



the turn is almost exactly equal to $l/(a + \phi_2 - \phi_1)$, where ϕ_1 and ϕ_2 are the front and rear slip angles respectively.

"We are beginning to realize that the vital question in handling the car is whether increasing centrifugal force causes ϕ_1 to increase faster than ϕ_2 causes the radius to decrease under increasing centrifugal force, which obviously leads to a vicious circle ending in a flat spin which will cause the car to turn around and proceed backwards.

"What the independent front end does is to oppose to the slip-angle thrust a small contrary force due to camber. This increases ϕ_1, causing the front end of the car to drift off its course slightly. The resulting increase in R gives the required stability in handling. Similar results can be obtained in an axle car by (1) loading front tires heavier than rear; (2) inflating front tires softer than rear; (3) applying traction to rear wheels (which decreases ϕ_2). The contrary result (instability) is obtained in an axle car by (1) overloading the rear end; (2) inflating the rear tires softer than the front; (3) applying traction to the front wheels.

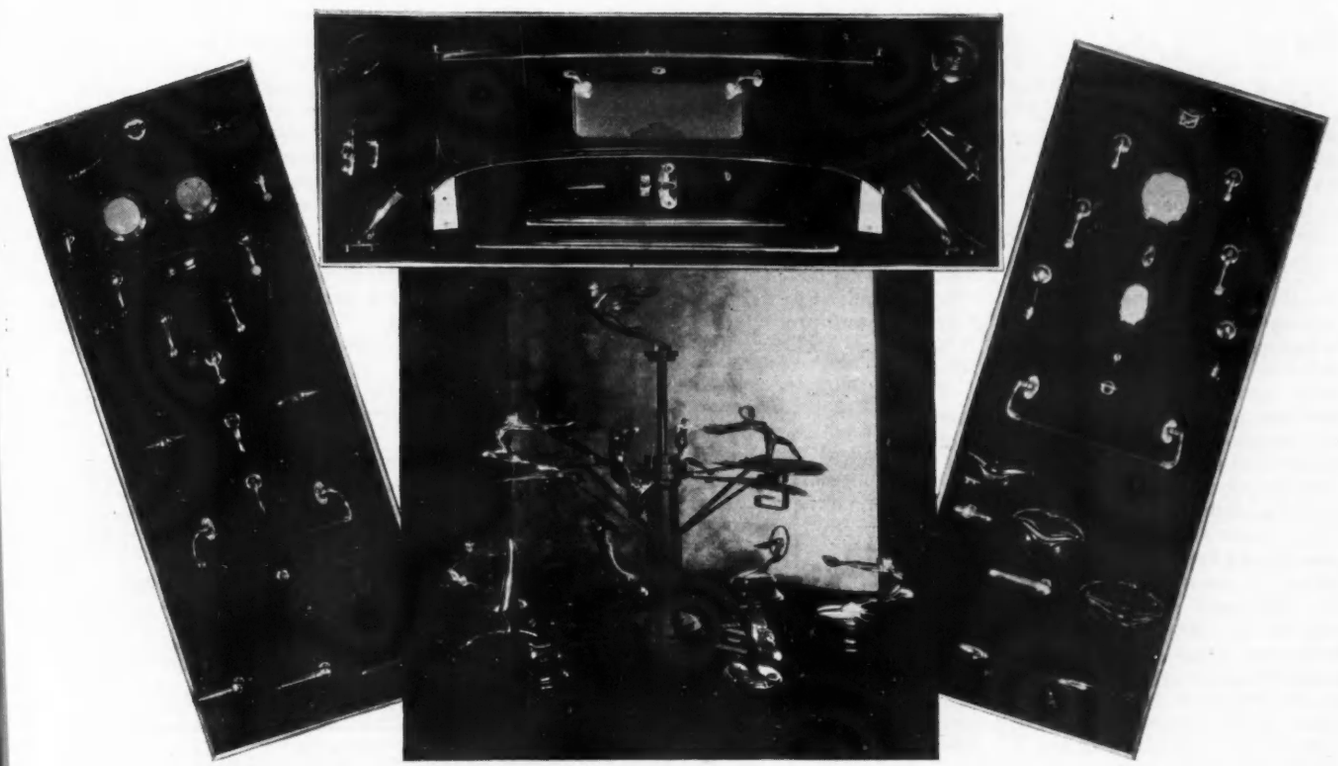
"The effect of independent fronts rolling with the car is to increase the steering effort, because (a) the front wheels must be turned through a slightly larger angle for a curve of a given radius; (b) the cambering of the wheels plus the increased slip angle both give a greater self-centering effort to the wheel. This is true of most conditions giving stable steering—that is, the steering effort is increased. On the other hand, a more efficient steering gear may be used safely with independents, because of the relative freedom from wheel fight, and because of perfect steering geometry.

"Naturally, the effects derived from the rolling of the independent wheels must (and can) be strictly controlled. Since the thrust due to wheel camber and its self-straightening effect increase with load, the necessity of controlling these effects becomes more apparent as the size and weight of the car are increased. Hence the use of anti-roll rods and devices to keep the outer wheel on corners more nearly square with the road, and to lose caster angle on the outer wheel —on the larger cars.

"There is another angle to this also: Smaller cars invariably have a higher k^2/ab ratio than larger cars, and therefore do not need to use quite such soft suspension (in terms of deflection) for a given standard of comfort. The angle of roll decreases rapidly as the deflection is increased, so that the phenomena dependent on roll are also reduced.

"The ratio of camber thrust per degree at normal load to slip-angle thrust per degree is roughly as 1 to 6. The only interest in this is that it represents about the ratio of camber to toe-in on a standard front axle. In other words, we get our front wheels so as to balance the two side thrusts. But it seems highly probable that in doing so we do not produce the best conditions either for rolling resistance or for tire wear, the reason being that the camber thrust is obtained with less actual scrubbing of the rubber against the road than is the toe-in thrust. Therefore, if we want to get least tire wear, the wheels probably should be mounted with little or no toe-in. This is a matter of experiment now in progress."

Hardware on 1934 Cars



Ternstedt Shows Wide Variety of Automobile Hardware in the 1934 Manner. Central Group Illustrates Some of the Radiator Ornaments Worn by the Well Dressed Car.

Tests Measure Noise Reduction with "Spoked" Laminated Timing Gears

by J. A. Petho
Gear Engineer, Continental-Diamond Fibre Co.

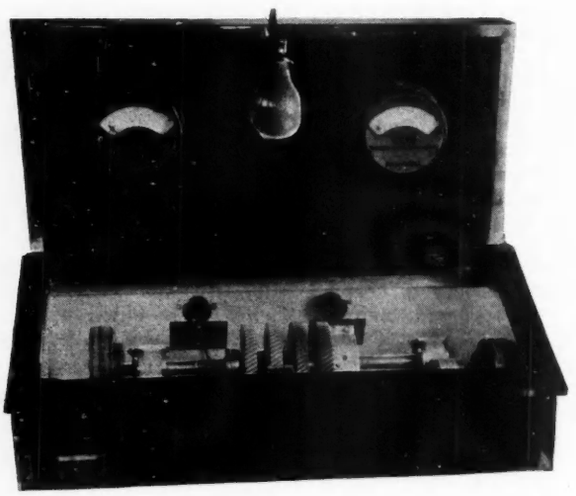


Fig. 1.—Gears are tested in sound-proof box containing a pick-up microphone.

SINCE the introduction of the Celoron "Spoke" timing gear to the automotive industry, a considerable amount of laboratory work and field tests have been conducted and the benefit of these results incorporated in the present "Spoke" gear.

The advantages of the "Spoke" gear over the solid web or conventional non-metallic gear can be summarized as follows:

1. Quieter operation.
2. Better shock-absorbing qualities.
3. Longer life.

It is well to recognize that no gears, whether made of metal or of phenolic laminated material, are absolutely noiseless in operation. Quietness is a relative term. Gears made with the most accurate workmanship, and of the best material, will develop a certain amount of noise when running under load at even moderate speeds.

Since all sound is characterized by waves of definite frequency and amplitude, these characteristics of frequency and amplitude must, therefore, enter into consideration of gear noise. The frequency of a gear noise is determined by the number of tooth contacts per second. The amplitude of a gear noise is the result of a number of factors, such as the material and shape of the gear and gear housing.

Phenolic laminated material answers the requirement of low tone frequency. The second requirement, a design which will not pick up or amplify sound, can be approached by breaking up the continuous line of the gear web. A complete break in the web line by the use of spokes, however, will eliminate the danger of pick-up and amplification of noises.

To prove these principles, the Continental-Diamond Fibre Company's Bridgeport laboratory designed a sound-measuring apparatus which has been used on an electric dynamometer as well as on automobile motors for comparative tests. The dynamometer used consists of an A.C. motor and a D.C. generator for loading, the gears to be tested being incorporated in the composite drive between the two. A sound-proof box (Fig. 1) containing the pick-up microphone is placed around the gears to eliminate all outside interference. The impulses are amplified by a suitable amplifier unit, the output of which is connected through an instrument transformer to a suitable meter.

Comparative tests on molded, solid web and spoke type gears designed for the same motor were conducted by mounting the gears on the dynamometer successively and meshing with the same crankshaft pinion. Center distances were adjusted so as to give a backlash of 0.003 in. The gears were run dry at a constant pinion speed of 1800 r.p.m., first without load, then under load of 3.08 h.p. and then 6.16 h.p.

Three sound measurements were taken at each load for each type of gear and the average recorded, as follows:

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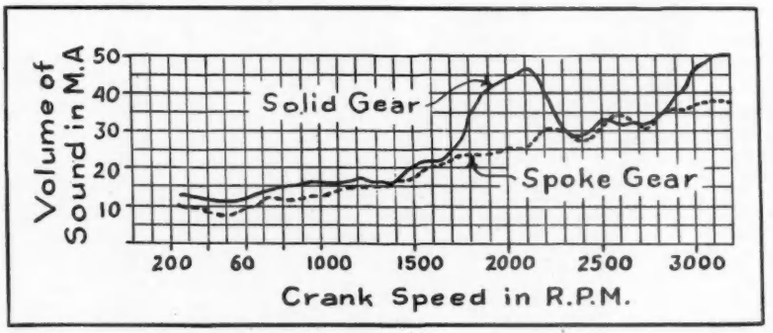


Fig. 2—Typical sound curve taken in an auto engine timing gear train shows the prevalence of critical speed harmonics with solid gears, and the total absence of such peaks when using spoked gears.

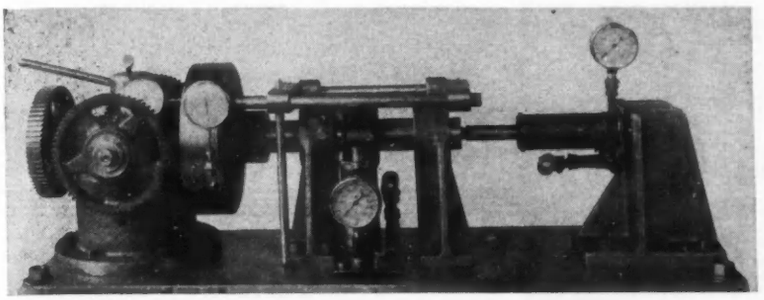


Fig. 3—Equipment developed for laboratory testing of static web deflection in molded gears.

Load	Volume of Sound OHP	3.08 HP	6.16 HP
Solid web gear	37.8 m.a.	37 m.a.	39 m.a.
Spoke gear.	14.3 "	12.25 "	13.25 "

Another set of tests were made on a standard automobile motor. A dummy front and end was installed in place of the timing gear cover. This cover was thick felt insulated so as to avoid outside interference, also to guard against vibrations of the motor block. The pick-up instrument was fastened inside of this cover. Speed and torque were identical for each measurement on each gear. The motor used had critical speed harmonics at 1000, 1500, 1900, 2100 and 3200 r.p.m., the strongest being at 2100 r.p.m. Measurements at these points were as follows:

Volume of Sound in Milliameters

Speed	Torque	Solid Web Gear	Spoke Gear
250 rpm	182 ft. lb.	12.6 m.a.	10.2 m.a.
1000 "	215 "	15.5 "	12.7 "
1500 "	215 "	20.8 "	17.8 "
1900 "	205 "	37.5 "	23.8 "
2100 "	197 "	45.5 "	25.3 "
3200 "	134 "	50.5 "	37.5 "

Figure 2 shows a typical sound curve obtained through tests conducted on one of the automobile motors. The sound curves of the solid web and spoke gears are imposed on each other to bring out clearer the point of importance, i.e., the critical speed harmonics. The solid web gear is very responsive to every one of these harmonics, because the number of tooth contacts are in step with the frequency of the harmonics which are transmitted through the solid web line, resulting in the amplification of the noise. The spoke gear, on the

(*Turn to page 295*)

The Story of General Motors

IN "The Turning Wheel," published this week by Doubleday, Doran & Co., Arthur Pound not only tells the story of the first 25 years of General Motors in a dramatic and interesting manner, but also weaves into the tale much of the history of the entire industry. The material and financial history of so great an organization is interesting in itself, especially to the members of the industry of which it is a part, but in addition the pages are brightened by a multitude of human interest sidelights. This is particularly true of the portion of the book which deals with the growing pains stage of the corporation's history which ended with the second Durant debacle in 1920.

Many of sidelights were presented in *Automotive Industries* of Nov. 18, 1933. There is space for a few more here.

As the result of closer machining, larger valves and improved timing, Henry M. Leland increased the horsepower output of one of the early Olds engines from 3.7 to 10.25. On taking the improved power plant to Mr. Olds, he refused to use it on the ground that he was getting all the business he could handle with 3.7 hp.

Buick once owned Cadillac. It happened this way. In the formation of General Motors, for some reason, the actual purchase of Cadillac was made by Buick. The purchase price incidentally was $4,500,000, cash on the barrel head, boosted from $3,500,000, the figure originally set by the Lelands which Mr. Durant did not accept promptly. Events have proved that Cadillac was well worth its cost.

Voting trust certificates of the General Motors Co. were the first automobile securities listed on the New York Stock Exchange. The date was 1911.

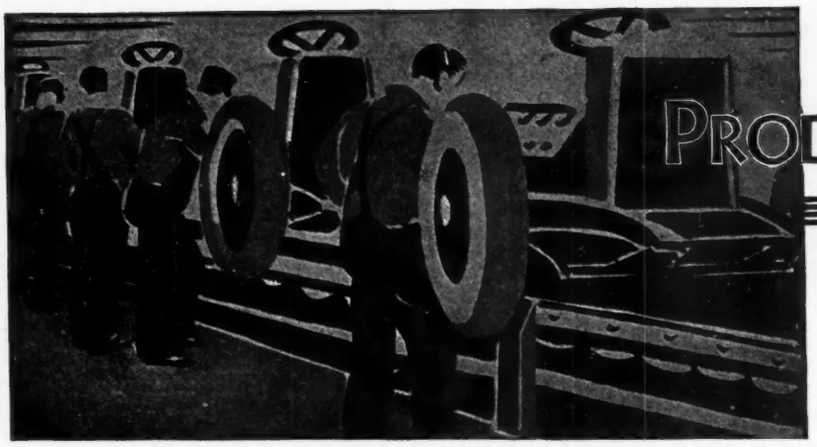
General Motors Truck Co. was incorporated in 1911 to handle the products of the Rapid Motor Vehicle Co. and of the Reliance Motor Truck Co.

General Motors dropped $5,000,000 to $12,000,000, the estimates vary, on a flyer it took into the incandescent electric lamp business. In 1910 GM traded 8,290 preferred shares and 74,775 common for Heany electric stock, John Albert Heany claiming to be the inventor of the tungsten filament light. In return for its investment, GM got nothing but trouble. Its interest in electric light finally was sold to General Electric for $1,205,000 cash and securities.

The Murray Body Co. organized the Guardian Frigerator Co. in 1916 as a pioneering project in the then almost virgin field of electric refrigeration. Mr. Durant became interested in the company in 1918. Guardian became the Frigidaire Corp. in 1919 and in the same year General Motors bought the company for $56,366.50.

Some interesting light is thrown on some of GM's recent sales policies by Mr. Pound. He says: "By systematizing retail efforts, and taking their message directly to the public through advertising, the manufacturers are sometimes accused of reducing automobile salesmen to the status of order takers. This trend, especially in the sales programs of great quantity producers, reached its height in 1929. With the development of a 'buyer's market' after 1930, selling became more difficult and good salesmen were more appreciated. Consequently, the stronger dealers little by little have insisted on more leeway. Even though control aimed at, and usually resulted in, better merchandising and higher dealer profits, human nature—even dealer human nature—sometimes resents being 'scheduled and programmed' too openly and too often."

There have been but three chairmen of the General Motors Board: Thomas Neal, 1912-1915; Pierre S. duPont, 1915-1929, and Lammot duPont, 1929-. Of the members of the present Board, C. S. Mott has served the longest period, having been elected in 1913; tied for second are A. G. Bishop, Pierre duPont, L. G. Kaufman and John J. Raskob, all of whom were elected in 1915. Mr. Mott is also the first of the present roster of vice-presidents to be elected, having assumed the title in 1916. T. S. Merrill has the distinction of being the corporation's only secretary. He has held the office continuously since 1917 when the corporation succeeded the company.



PRODUCTION LINES

Take a Tip

Our attention has been drawn to a number of really outstanding inspection and testing devices designed primarily for service stations. We think the reason why these instruments have not clicked as they should, is that they have not been sold to the engineers and service managers back at the factory. If you have a story to tell make sure to get it over to the factory personnel first.

Plated Tools

Much activity evident in the way of prolonging the life of tool shanks and bodies by chromium plating. And this is particularly important, it seems, on tools tipped with cemented-carbides because much of the saving is lost if the body gives out before the tool tip. A late report shows that a certain reamer when chrome plated showed an increase in life from 72,000 holes to 1,600,000 holes, truly phenomenal performance. Investigation now underway hopes to determine the effect of chromium plate on cemented-carbide tips. At present when the tool is plated the plating usually is ground off the tip. Should it be permitted to remain? We hope we can have the answer soon.

Ball-Bearing Data

A ninth edition of its ball-bearing catalogue has been published by the New Departure Manufacturing Company. Like most catalogues of firms in the anti-friction-bearing industry, it contains a good deal of technical information that is helpful in the design of machinery fitted with such bearings.

Briefly, the new catalogue lists new bearing types, new sizes of existing types, and new prices on bearings. Other features of the book include sections on Bearing Design and Load Characteristics, Typical Mounting Designs, Factors for the Selection of Bearings at Electric Motor Speeds, Factors for Selecting Bearings for Speeds down to 10 r.p.m., Fits and Weights for all Bearings, and a Telegraph Code.

Big Change

One well-known gear machine manufacturer has given us the details of a machine which is still in blueprint form but holds great promise. It employs a cutter of exceedingly large diameter reciprocating vertically but without rotation. Around it are mounted six rotating work spindles having a planetary motion about the cutter. It is claimed that within one work cycle the machine can rough-cut, finish-cut, and shave or burnish the work.

Cyanide Antidote

Amyl nitrite, well known as a heart stimulant, is a better antidote in cyanide poisoning than the dye, methylene blue, it appears from experiments reported to the *Journal* of the American Medical Association.

The experiments that have been carried on by these research workers indicate that amyl nitrite is at least twice as efficient an antidote to cyanide as the blue dye.

Newcomer

First copy of the Aluminum News Letter, an attractive little magazine for those whose interest goes aluminum-wise, has come over our desk. Its object, as we see it, is to give up-to-the-minute news about the aluminum industry. We'll be glad to put your name on the mailing list.

Alcohol Blends

R. B. Gray of the Federal Bureau of Agricultural Economics in a recent speech said that gasoline with 10 per cent alcohol would cost the motorist at least three cents more per gallon retail. That's with corn at 50 cents a bushel. Higher corn—higher blend cost.

Just Double

Inventions seeking improveme of aircraft increased 100 per cent in 1933, according to a recent report to the Manufacturers Aircraft Assn. Members of the association jointly own or control 605 active patents.

Iron Dies

Don't fail to get a copy of Nicke Cast Iron Data, Section 1. It gives a complete summary of current nickel and nickel-chromium applications in dies for sheet metal fabrication.

Wheel Balance

Talking about equipment reminds us that those who are balancing wheel and tire assemblies are in the market for real workmanlike tools to work with. It seems some of the balancing equipment has been very crude and incapable of doing a good job.—J. G.

Close-up showing magazine feed and arrangement of regulating wheel on new Heald internal centerless grinder

Internal Centerless Grinder by Heald

THE first internal centerless grinder to be made available to the automotive industry has been ushered in by The Heald Machine Company, Worcester, Mass., well-known makers of internal grinding equipment. The machine operates hydraulically and makes possible the chuckless grinding of precision work, thus removing the problems of concentricity which so often complicate the manufacturing program.

Heald internal centerless grinders are entirely automatic in operation, the size of the finished bore being held within close tolerances by either the Size-Matic or the Gage-Matic principle. The machines can be made to embody both sizing principles.

With the chuckless type of grinder the arrangement of the work controlling elements is such that a uniform wall thickness is produced as it is governed by the distance between the grinding wheel and the regulating roll. In fact, when a workpiece is ground on an arbor and swung between centers the indicated concentricity is within 0.0001 in.

There are two ways of locating the work in internal centerless grinding, i. e., locating and squaring up from the outside diameter; locating from the outside diameter and squaring up with the back face.

The centerless loading cycle starts after the finished workpiece leaves the wheel and is controlled by a hydraulically actuated mechanism interlocked with the table movements in such a manner that it is impossible for the table to start toward the wheel until the cycle is complete.

When a workpiece is finished the table runs out to loading position where the work is ejected from the machine and a new workpiece is positioned for grinding by the loading arm. The loading arm moves in a clockwise direction and discharges the finished workpiece over the regulating roll and at the same time a cam on the loading arm shaft actuates a work stop which allows an unfinished workpiece to leave the loading chute. The workpiece leaving the chute first rests on the back surface of the loading arm and as the arm moves in an anticlockwise direction the workpiece finally drops onto the regulating roll and is led into position on the rest roll.

The work driving unit for the regulating wheel is a compact, self-contained unit, having an individual ¼-hp. motor to drive the regulating wheel spindle, carried on a sub-base which is pivotally mounted on the reciprocable table so that taper work can be ground. This work driving unit is transversely adjustable relative to the table movement in order that different lots of workpieces having different outside diameters can be ground.

Using a hydraulic medium for actuating the feed mechanism makes possible five separate feed adjustments although seven distinct functions are performed by the cross slide during each grinding cycle. These functions consist of a pick-up feed upon entry of the wheel into the work, reduction of feed to roughing feed, roughing feed to a semi-finish feed, stopping of feed movement to true the wheel, a further reduction of feed to practically nothing for a spark-out feed, and finally, upon the hole reaching the predetermined size, backing off the wheel and compensating for wear due to grinding and truing.

Where an extremely high finish is not necessary, the spark-out feed can be eliminated to speed up production without sacrificing the accuracy of the hole.

On machines controlled by the Size-Matic principle, the interruption of the grinding for dressing is procured by means of the left hand cam also carried by the annular member.

On machines controlled by the Gage-Matic principle the interruption for dressing is procured by means of a trip screw which is controlled by the entry of the roughing gage into the work.

Compensation for the reduction in diameter of the wheel due to wear and truing is made when the wheel is backed off from the work.

The wheelhead is the Heald Red Head which has special super-precision matched bearings and is ruggedly built for speed. A single length of belt is suitable for practically all sizes of pulleys as the difference in required length is taken care of by automatic, ball bearing mounted take-up idlers in the base.

Maximum length of hole that can be ground on this machine is 3 in., while the maximum outside diameter is also 3 in. Minimum diameter of hole about ¼ in.

Floor space required is 31⅝ x 57¾ in. Net weight, 5000 lb.

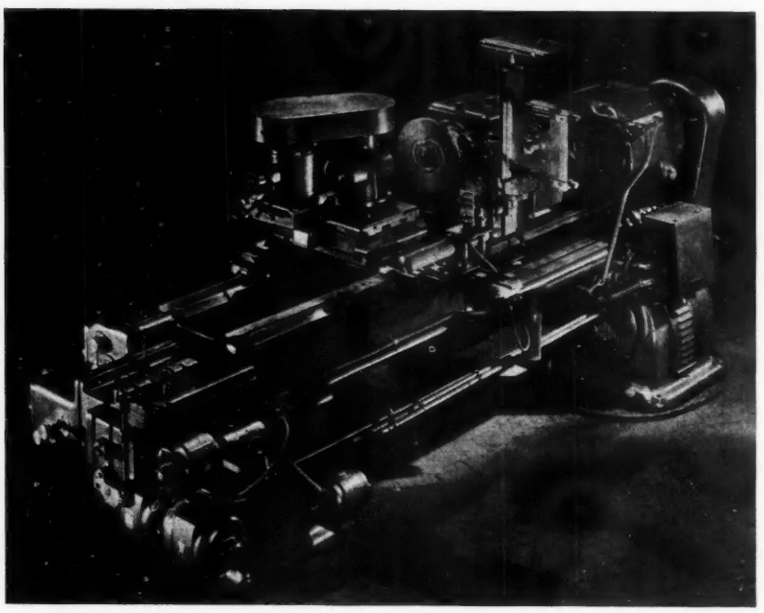
View of Heald internal centerless grinder

NEW DEVELOPMENTS

Automotive Parts, Accessories and Production Tools

Monarch Announces Cam Milling Attachment

The Monarch Machine Tool Company, of Sidney, Ohio, has announced the development of the Cam Milling Attachment, consisting of a sub-headstock that bolts on the bed of the lathe directly in front of the regular headstock, driven by a silent chain from a sprocket bolted to the flanged spindle nose of the regular headstock. A complete universal milling fixture fits readily on the carriage of the lathe, in place of the regular compound rest.



This attachment can be applied only to the Monarch-Keller controlled lathe. It is especially adapted to milling face cams, single or double-track cams, barrel cams and other irregular contour work from a master template.

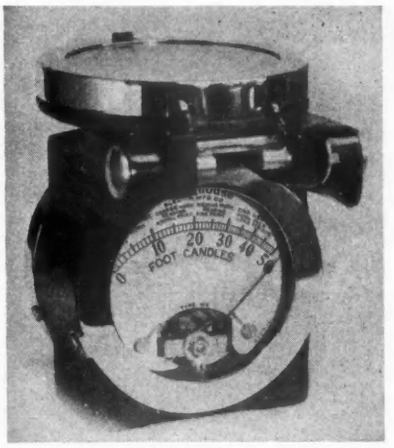
The milling headstock has a worm drive spindle giving a 450-to-1 reduction from the spindle speeds provided in the main headstock of the lathe. The flanged spindle nose, on the milling headstock, is identically the same as the flanged spindle nose on the headstock proper . . . so that all chucks, plates and fixtures will readily interchange.

The milling spindle is mounted on the carriage of the lathe swivels at any angle. The drive to the milling spindle is from a 1-hp. a. c. motor mounted vertically on a movable bracket on the carriage. Three-groove Vee-belt pulleys are provided, which may be interchanged between the motor and the milling spindle, thereby giving six milling spindle speeds as follows: 200, 315, 485, 700, 1090 and 1700 r.p.m.

A Few Seconds to Check Light Conditions

A "Right Light" Meter for measuring light intensities and making illumination surveys is announced by the Westinghouse Electric and Mfg. Co., Pittsburgh, Pa. Only a few seconds are needed to check lighting conditions at any point, since the dial is marked in foot candles with zones denoting the minimum amount of light needed for specific types of work.

The new meter embodies many unusual features, among which is the

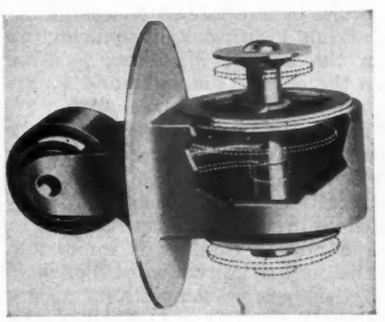


Westinghouse Photox cell, a recently developed photo-voltaic cell, which changes light energy directly to electric energy without an auxiliary source of electrical supply. The Photox cell and the microammeter, which measures the cell current, are mounted together in a neat molded case. The cell is hinged, protecting it against breakage and protecting the instrument dial and Photox cell when the unit is not in use.

Dole Balanced Thermostatic Valve

A new balanced thermostatic valve has been announced by the Dole Valve Co., Chicago. To offset bearing friction and hydraulic forces, the inside and outside valve disks are placed at right angles to the valve shaft. Hydraulic forces on the valve disks neutralize each other, because the disk areas exposed to the jacket water are of the proper proportions.

There is an external balancing disk which neutralizes hydrodynamic forces. Test made showed that in regular operation the valve will open and close within a few degrees of the opening and closing temperatures in still water, thus proving that the operation is not affected by water pressure.



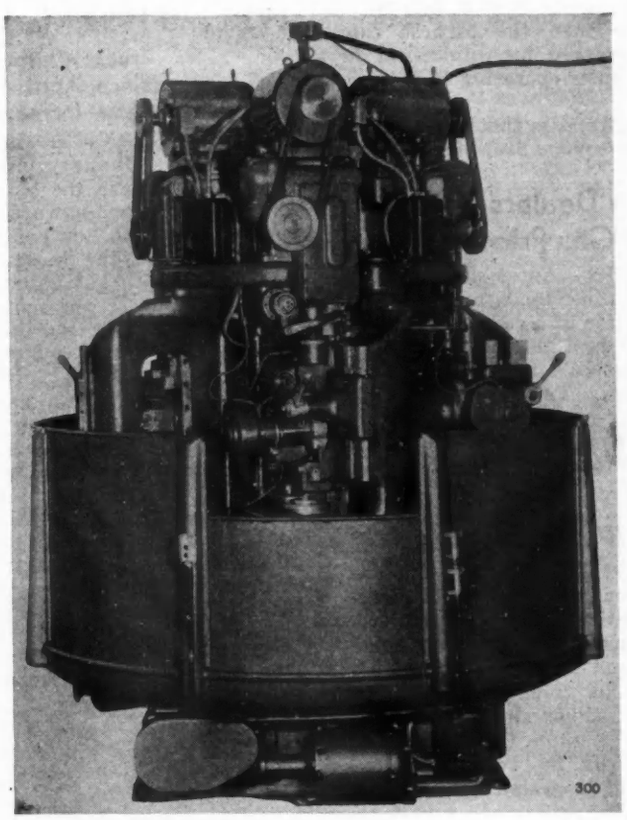
A special machine operation is said to assure a good seat of the valve and to keep bleed and leakage under definite control. The thermostat element is connected to the valve by a special universal joint, which prevents it from binding or sticking.

NEW DEVELOPMENTS
Automotive Parts, Accessories and Production Tools

Rotary Hobber of Great Flexibility

The Lees-Bradner Co., Cleveland, Ohio, has just brought out a heavy duty multiple spindle rotary hobbing machine that will take gears up to 7 in. O.D. 9-in. face, and up to 4 D.P. It is said to be extremely flexible, being adapted to hobbing spline shafts, worm wheels, spur or helical gears.

The machine is fully automatic. Power input is through a circular collector at the top, the 3 h.p. constant speed driving motors on the separate hobbing units being automatically controlled by travel limit switches which start each motor after passing the loading position and stop each motor after the cycle of operation is completed, before the loading point is reached. The operator merely loads and unloads the work spindle. Two push buttons control the starting and stopping of the machine—one handles table rotation—the other starts pump motor and stops both the pump motor and rotation of table.



Another feature is that several different jobs can be handled simultaneously, each unit being arranged to take a different job. If necessary, where one job requires more time than another, this particular unit can be set to revolve twice around the table to allow enough time to complete the operation while the other units are completing two pieces.

The unit construction consists of 4, 6 or 8 hobbing units, each with individual constant speed motor drive and independent hob feed and speed changes mounted on a rotating table which is actuated by a separate 2 h.p. constant speed motor through worm and worm wheel. The rotation of the table can be timed from one revolution per minute to one revolution in 16 minutes through pick-off gears.

The rotating table, carrying the hobbing units and driving mechanism, is mounted on a substantial base and the entire active weight is supported on a large Timken roller bearing having a rated capacity of 50 tons. The outside diameter of the base of the four-spindle machine is 8 ft. 3 in., and of the 6 and 8-spindle machines, is 9 ft. 4 in. Overall height of all machines is 115 inches.

Portable Welder for Factory Use

A portable Lectrowelder shop welding outfit working from the A.C. current supply, 230-460 or 115-230 volts, has been placed on the market by the Pittsburgh Lectrowelder Corp., Pittsburgh, Pa. It is conveniently adjustable as to electrode currents. A selective variation of approximately two hundred amperes may be made by the operator to accommodate different types of welding work. The voltages are also suitably adjustable.

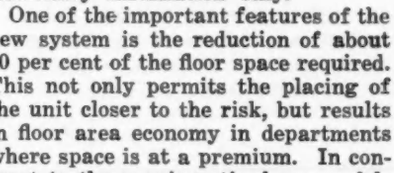
The Lectrowelder has no moving parts. It is built compactly and can be readily moved about, as it is mounted on small rollers for easily moving over the floor, and where extra portability is desired, is mounted on a hand truck. The Lectrowelder weighs approximately three hundred pounds. The equipment is housed in a stout, steel, weatherproof case and may be operated on outdoor work.

The machine is fitted with an automatic diverter which gives substantially constant current and easy striking of the arc without "sticking."

Improved Foamite Fire Protection System

A new fire protection system, Foamite System Type ST, for dip tanks, drain boards, quenching tanks, mixing churns, cleaning tanks, and a wide variety of vessels containing flammable liquids has just been developed by the American-LaFrance and Foamite Corporation, Elmira, N. Y. It is designed and built for stationary installation only.

One of the important features of the new system is the reduction of about 50 per cent of the floor space required. This not only permits the placing of the unit closer to the risk, but results in floor area economy in departments where space is at a premium. In contrast to the previous tip-down models requiring sufficient operating clearance at all times, the moving parts of the new type are actually enclosed—



there are no vital parts exposed to tampering that might cause accidental discharge.

All units of the new system have full openings at the top and ample drains at the bottom. This makes recharging easy and thus reduces maintenance costs. Actual inspection of the interior can also be made at any time.

Truck Selling Code Sets Depreciation Scales for Fixing Maximum Allowances

Proposed Supplement to Motor Vehicle Retail Code Covers Trucks of More Than ¾ Ton Capacity—Will Be Administered by Code Authority of 12 Members

WASHINGTON — A sliding scale basis of depreciation for determining maximum allowances on trucks of more than ¾-ton capacity are proposed in a code of fair competition for the Commercial Motor Vehicle Trade, filed with NRA this week. The scales are given in detail at the end of this article. The code is offered as a supplement to the Motor Vehicle Retailing Code from whose marketing rules trucks of more than ¾-ton capacity were exempted.

Administration of the new code will be by a Code Authority consisting of 12 members, four appointed by the National Automobile Dealers Association and eight by the Truck Trade Practice Committee of the N.A.C.C.

Except in the method of establishing used truck allowances, the marketing rules in the supplement for the most part follow those in the car dealer code. Each truck maker is required to file with the Code Authority schedules of list prices of all current models as well as of standard or usual accessories. Such list prices can not be reduced except after 30 days written notice to the Code Authority which will notify all truck makers of the revisions and their effective date. Price increases, however, may be made effective immediately on notice to the code authority. Long term contracts entered into prior to July 1, 1933, and calling for delivery in 1934, must be canceled.

Sales below delivered prices established in the same manner as under the dealer code are barred. Demonstrators may not be sold at less than the new prices, unless they have seen 60 days or 3500 miles service.

All persons regularly owning or operating 10 or more trucks, or buying five or more trucks within a year, are eligible to receive a fleet discount on vehicles and parts. The maximum discount allowed in this way must be filed with the Code Authority. Provision is made for cleaning up obsolete models at reduced prices. Parts and accessory list prices must be observed. Financing charges must not be lower than the lowest rate or a higher rate than the highest rate regularly charged by established finance companies operating in a territory.

The code proposes that independent

(*Turn to page 295, please*)

Canadian Dealers Would Fix Used Car Prices

TORONTO — Automobile dealer organizations in Canada are agitating for the adoption of a code to fix trade-in values on used automobiles as provided in the NRA machinery in the United States. The desire is being expressed for a schedule of used car values on a zone system and the matter is being discussed at dealer gatherings.

Thomas W. Henderson

CORAL GABLES, FLA.—Thomas W. Henderson, co-founder and director of the National Automobile Chamber of Commerce, died at his home here on March 1, at the age of 85. Previous to his retirement about 15 years ago, he was president and treasurer of the Winton Co., Cleveland. He is survived by two sons, five daughters and 11 grandchildren.

January Automotive Payrolls Gain 53% Over Last Year; Employment Rises 43%

WASHINGTON—January automotive payrolls were 53 per cent larger than in the same month last year, according to the indexes of the Federal Reserve Board. Automotive employment in January also showed a big gain over last, the increase in this case amounting to 43 per cent. These gains compare with a rise of 24 per cent in unit production. The larger increases in employment and payrolls reflect the shorter hour and higher wage schedules in effect, and in addition an increase in the hours per worker. The Board's indexes follow with seasonally adjusted figures marked (*):

	Jan., 1934	Dec., 1933	Jan., 1933
Automotive Production..	50	26	40
Automotive Production..	58*	48*	48*
Automotive Employment	71	59	50
Automotive Employment	75*	67*	53*
Automotive Payrolls	55	43	36
Pay per Worker*	77	73	72

*Derived figure.

NE

Jan. Output Betters 1933 and 1932 Marks

Truck Output Biggest Since April, 1931, Cars Show Increase of 12%

WASHINGTON—Despite manufacturing delays, January production of cars and trucks in the United States and Canada surged upward to 167,910, the best monthly output since last September and the largest January total since 1931. The gain over January, 1933, was 26 per cent.

This encouraging showing was due in large measure to a big expansion in truck output, the total for the month being 46,687, a gain of 110 per cent over 1933, making it the biggest January since 1929 and the largest production for any month since April, 1931. Passenger car production also showed a gain over last year but of smaller proportions since it was affected more by manufacturing difficulties. The January car total was 121,223, a gain of 12 per cent over January and of 19 per cent over 1931.

Canadian production included in the foregoing amounted to 4946 cars and 1958 trucks for a total of 6904 which was more than double the January, 1933, total for the Dominion of 3358.

Cuts in Coast Freight Rates Recommended

WASHINGTON—To meet Panama Canal competition on passenger cars, an examiner of the Interstate Commerce Commission this week recommended that carriers be authorized to reduce rates from automobile producing centers to California seaports. He refused to recommend similar reductions on shipments of trucks.

Ford Builds 59,337 Units in February

DETROIT — Ford production of cars and trucks in the United States totaled 59,337 in February as compared with 57,575 in January and a March schedule of 83,000.

WS

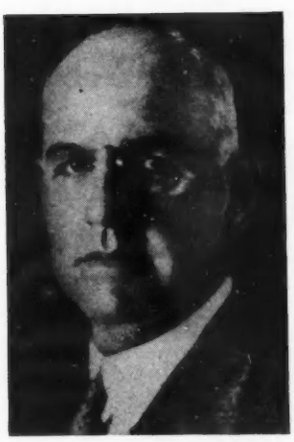
N. A. C. C. Names Code Conference Delegates

Macauley Appoints Imposing Array of Major Executives

NEW YORK—Fourteen representatives of the automobile manufacturing industry have been designated by Alvan Macauley, president of the National Automobile Chamber of Commerce, to participate in the conferences of code authorities and trade associations in Washington, March 5 to 7.

Those assigned to represent the industry at the various sessions are:

GROUP 1—*Employment:* W. S. Knudsen, Executive Vice-President, General Motors Corporation; K. T. Keller, President, Dodge Brothers Corporation; W. J. Cronin, Secretary, Manufacturers' Committee of the Chamber.



Alvan Macauley, N.A.C.C. president, who will head the Chamber's delegation to the NRA Code Conference.

GROUP 2 — *Prices:* B. E. Hutchinson, Vice-President, Chrysler Sales Corporation.

GROUP 3—*Production:* Donaldson Brown, Vice-President, General Motors Corporation.

GROUP 4—*Overlapping Codes and Compliance:* F. D. Siefkin, International Harvester Company; Alfred Reeves, Vice-President of the Auto Chamber.

GROUP 5—*Small Enterprises and Minorities:* M. A. Cudlip, Vice-President, Packard Motor Car Company; Paul G. Hoffman, President, Studebaker Sales Corporation.

Besides Mr. Macauley, and in addition to the above, the following have been accredited as representatives to attend any of the sessions:

Stephen M. DuBrul and J. W. Dineen, General Motors Corporation; Pyke Johnson, Vice-President, National Automobile Chamber of Commerce; Oscar P. Pearson, Manager, Statistical Department of the Chamber.

335,000 Output Scheduled for March W Give Best 1st Quarter Total Since 1930

Tense Labor Situation Threatens Continuity of Production—Early Reports Indicate February Retail Sales Running Far Ahead of Last Year

by A. F. Denham

Detroit Editor, Automotive Industries

DETROIT — March production of new cars and trucks in the United States and Canada is at present scheduled to attain a total of between 335,000 and 340,000 units, the largest single month's production since early 1930 with the exception of April, 1931. The individual factory schedules for March represent a total for the industry almost three times that of March last year when some 124,000 units were produced.

If this total is achieved for March, it will bring the first quarter total for the industry above the three-quarter million mark, exceeding any similar quarter since 1930.

In compiling these estimates some effort has been made to discount the effect of present labor troubles although this is an extremely difficult matter. Settlement of the strikes at Toledo, Wednesday night, as reported elsewhere in this issue, offered further hope that schedules can be maintained. The fear had been expressed that the strike might spread to other communities. Still remaining to be settled are labor difficulties at the Nash plants in Racine and Kenosha, however. In the Toledo strike settlement there was involved the signing of an agreement that employers would respect section 7A but the agreement does not pick out any one group as representing labor and therefore does not involve institution of closed shops.

Several minor temporary walkouts have also occurred at other parts plants in the industry during the past week, but all were quickly settled, generally on the basis of a wage compromise. Automotive workers universally have been demanding a 20 per cent increase in wages as was predicted in *Automotive Industries* a few weeks ago. Some car plants have had to make further upward readjustment of wages. If the movement spreads a possibility of further increase in car prices may have to be faced.

In connection with labor difficulties and wages, an interesting statement was issued by W. S. Knudsen last

(*Turn to page 295, please*)

APEM Names 5 Delegates To Mar. 5 Code Conference

DETROIT—C. C. Carlton, Motor Wheel; Dave Rodger, Federal-Mogul; C. S. Davis, Borg-Warner; C. E. Wilson, General Motors, and Clarence Skinner of the association staff, will represent Automotive Parts & Equipment Manufacturers, Inc., at the General Code Authority Conference beginning in Washington on March 5.

Spicer Will Continue to Make Shock Absorbers

DETROIT — Reports published in Toledo to effect that Charles R. Dana had announced the discontinuance of shock absorber manufacture due to unprofitable operations were denied as without foundation by the company today. Spicer supplies shock absorbers to Ford, Judson, Auburn and Continental among others.

Pierce-Arrow Gets 12 World's Speed Records

PARIS (*by mail*)—Twelve world's records previously held by European automobiles have gone to the United States, according to the decision just issued by the International Sporting Commission. The records are those established by Jenkins on a 12-cylinder Pierce-Arrow, at Salturo, Utah, on Aug. 6 and 7. In addition to the world's 24-hour record, previously held by a Voisin car at Montlhery, the Pierce-Arrow has secured the following 11 world's records: 500 kilometres (500 miles), 1000 kilometres (1000 miles), 2000 kilometres (2000 miles), 3000 kilometres (3000 miles), 4000 kilometres, six hours and 12 hours.

Budd Employees Schedule Election to Be Held Under NRA Supervision

National Compliance Board Recommendations Are Accepted and Will Govern Vote Set for Week of March 4—Board's Decision Clarifies NRA's Position of Works Councils

PHILADELPHIA — Budd employees will hold an election during the week of March 4 under the supervision of National Compliance Director Davis at which they will settle the question of the form of self-organization through which they will deal with the management. The election, which is expected to wind up one of the most important controversies which has developed under NRA, will be held in accordance with the recommendations of the National Compliance Board which were made public on Feb. 23. Arrangements for the election are being handled by the representatives elected last September, who have named a committee to meet with Mr. Davis in Washington to frame the notice of election and the ballot to be employed.

In the report of the Compliance Board on the case, which was released last week, the charge of interference with the workers' right of self-organization was sustained. The board held that the workers had not been given an opportunity to vote on the form of self-organization they desired, if any, and that in establishing the basis of representation and the qualifications of representatives in the election held last September, the company interfered with the workers' rights.

The board's recommendations follow in detail:

1. That, under the supervision of the National Compliance Director, a ballot be prepared and an unrestricted referendum vote be taken of the employees to determine whether they desire to set up any form of self-organization and, if so, whether they prefer organization within the plant or organization outside of the plant, or any other particular form of self-organization.

2. That the ballot also include, with full opportunity for expression of choice on its salient features, the plan for self-organization of the employees and for the proposed employee-representative agreement with the Company, as prepared by the nineteen (19) elected representatives, which shall be printed and circulated among the men, together with the statement referred to in the following paragraph, with ample time and opportunity for consideration, discussion and suggestions by the men before the vote is taken.

3. That this submission be accompanied by a carefully prepared statement, approved by the National Compliance Director, outlining the questions involved in the plan so that the employees may clearly understand the alternatives between which they are asked to make a choice.

4. That the Budd Company, which has already reemployed approximately eight hundred (800) men, shall, as the continued increase in the volume of business makes it possible to do so, reemploy all of those men who took part in the strike who are still out of work and available for reemployment.

If this plan is accepted by the Company it will be understood that any disputes arising out of its execution may be referred to the National Compliance Director by either side.

If the plan is not accepted, then we recommend that the Blue Eagle be removed; that all Government contracts be canceled; and that the case be referred to the Attorney General for action.

From the recommendations and discussion of this case, it seems fair to summarize the board's views as to the requirements an employer must meet in connection with a works council plan to avoid interference with the workers' rights under Section 7a:

First, employees must be given an opportunity to determine freely whether they want any form of self-organization and, if so, whether they want a works council, an outside union, or any other form of self-organization.

Second, having determined the form of self-organization they want, it is their right freely to establish the basis on which representatives shall be elected and what their qualifications shall be.

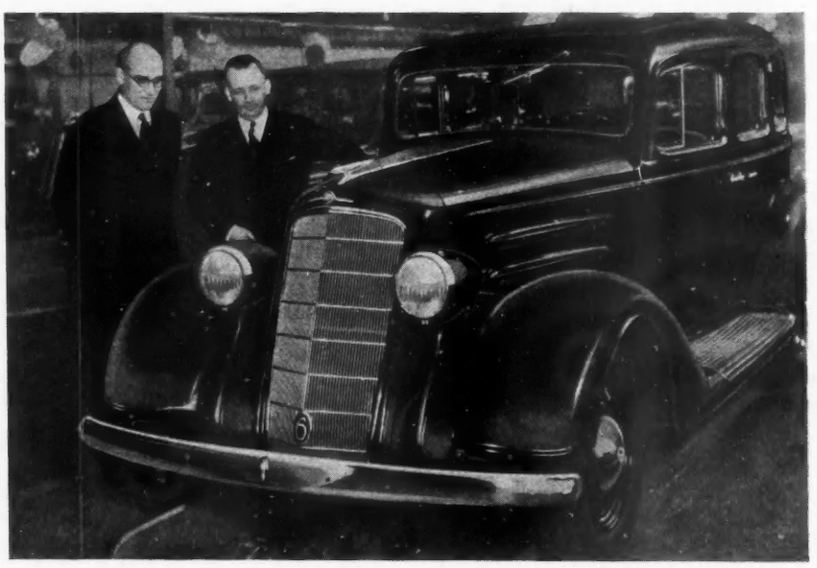
In effect the board found that procedure at the Budd plant did not meet these conditions and hence sustained the charge of interference. The board's decision indicates, however, that the submission of a plan of organization by the management does not constitute in itself interference with the workers' rights, provided the workers are given an unrestrained opportunity to say whether they want the plan offered and to modify it as they see fit, or to select some other form of organization to represent them.

Commenting on the board's recommendation, President Budd said that the proposal that strikers be taken back as the increase in business warrants "relieves us of the suggestion that we discharge loyal employees to make places for those who left their jobs." It was a suggestion from the National Labor Board that all strikers be immediately reemployed that was in part responsible for the company's refusal to accept the National Labor Board's findings. As to the board's election recommendations, Mr. Budd said this was something for the men to settle without interference "from us or anyone else." In this connection, the board revealed in its discussion of the case that the representatives elected in September had requested that it observe an election on the modified plan referred to in the second recommendation.

1929 "Street" Loans of Motor Makers Revealed

WASHINGTON—The classic economic precept that capital goes where profits are, was demonstrated again by the revelation of 1929 call loans by leading corporations before the Senate Committee on Banking and Currency. Among the automotive lenders were Auburn with total loans of $1,600,000; Chrysler with a maximum amount loaned at any one time of $60,150,000, and General Motors with $105,700,000 total and $25,000,000 peak.

Production Commences On New Oldsmobile Six



Governor Comstock of Michigan and Charles L. McCuen (right), Oldsmobile general manager, watch the first 1934 Six come off the line

Strikes in Toledo Parts Plants End Following Pay Increase Agreements

TOLEDO, Feb. 28—Workers in four plants on strike voted late today to return to work under a truce by which they were granted five per cent flat pay increases and further adjustments at the Spicer plant bringing average wages 12 per cent higher. The agreement also is understood to recognize collective bargaining without picking out any one group as representing labor so that the settlement does not mean the closed shop. The four plants involved are Spicer, Auto-Lite, Logan Gear, and Bingham Stamping.

The United Automobile Workers Federal Union No. 18,384 said to have 4,500 members, the International Association of Machinists and the Brotherhood of Blacksmiths, Drop Forgers and Helpers were included in the truce agreement negotiated through Chairmanship of Philip C. Nash, President of University of Toledo, after a six-hour conference Wednesday. H. D. Friel, Department of Labor conciliator, aided in calling the conference together.

Under the truce "negotiations will be renewed for the purpose of endeavoring to arrive at improved standards to become effective as of April 1" and any wage boosts subsequently agreed upon for machinists or drop forgers in addition to the present five per cent will be retroactive to March 1.

All workers will be taken back up to March 5 except where orders have been lost or work changed.

Charles A. Dana, President of Spicer, announced that company would discontinue a shock absorber line which has employed 900 workers. In view of the strike settlement this decision may be reconsidered. Dana was cheered by the workers as he addressed them after their decision to return to work.

The Spicer Manufacturing Corporation plant was shut down late last week due to a walk-out of nearly 2,200 workers who were joined by groups from Electric Auto-Lite Company, the Logan Gear Company and Bingham Stamping and Tool Company plants. United Automobile Workers Federal Union took out nearly 3000 workers, and machinists' and drop forgers' local unions joined them. Automotive workers demanded 65 cents an hour minimum and 45 cents for women workers, seniority rights, recognition of their union, and equal pay on same jobs for women. The machinists demanded a flat 25 per cent increase and the drop forgers 20 per cent, with rates ranging from 66 to 85 for machinists and higher for drop forgers.

Prior to the settlement today, Charles A. Dana, president of Spicer, had taken personal command of the situation in Toledo, talked to scores of meetings of strikers and made a general reclassification of jobs to give the workers another increase of from five to ten per cent in addition to the flat increase. The other plants said they could go no farther than the five per cent which was obtained through Philip C. Nash, president of University of Toledo and chairman of the Sub-Regional Labor Board.

At Auto-Lite, C. O. Miniger announced that all departments were operating and that approximately 95 per cent of employees were loyal and remained at work.

All of the four plants involved are contractors of automotive parts and fear loss of work here if the strike is prolonged. The Spicer plant has been turning out 6000 shock absorbers daily for Ford and has contracts with several other manufacturers for its new shock absorber.

Studebaker Will Sell Racing Motors at $750

SOUTH BEND — Production and sale of racing motors for Indianapolis and other speedway competitions has been announced by Paul G. Hoffman, president of the Studebaker Sales Corporation of America.

An eight-cylinder racing motor which has the present Studebaker President motor as its base will be produced and will sell at the low figure of $750. A higher compression ratio will be used and there will be a different high compression head than is used in the present President motor. Four down-draft Stromberg carbureters will be fitted and a magneto to eliminate carrying of a battery will be installed. A new water pump drive will also be added, because the generator shaft, which now drives the pump, will not be used. The motors will be of 250 cu. in. displacement and will produce about 150 hp. Otherwise the power plants will be practically stock.

Ford Puts 10 Million in Steel-Making Machinery

DETROIT—With the addition of the blooming mill, continuous hot sheet mill and cold rolling mill equipment, which the Ford Motor Co. has ordered from the United Engineering and Foundry Co., it is estimated that the company will be in a position to produce in the neighborhood of 30 per cent of its steel requirements. The additional equipment, which it is reported will cost $10,000,000, rounds out the company's steel-making facilities with resultant economies. It is thought also that the elimination by the steel code of concessions to quantity buyers is a factor in the expansion program.

Jack Gray

DETROIT—Jack Gray, director of equipment sales for AC Spark Plug Company, died here from a heart attack on Feb. 21, after an illness of about three months. Mr. Gray has been with the AC company for 16 years and his headquarters were in Detroit. He was widely acquainted in automotive circles throughout the United States and Canada. He leaves a widow, Matilda Gray, a daughter, Mary, his father, John Gray, of Los Angeles, and three sisters.

Jack Gray

Mr. Gray was born in Orillia, Ontario, in 1890. He graduated from St. Andrews College, of Toronto, with a degree of mining engineer. He served in the Aviation corps of the United States Army during the World war and rendered valuable service to the Government as an expert on airplane engines.

NRA Investigating Labor Complaints Against Ford

WASHINGTON—During the latter part of this week, NRA is scheduled to hold a hearing of labor complaints against the Ford Motor Co. in Chester, Pa. National Compliance Director Davis has invited Edsel Ford to attend but, since Mr. Ford did not come to a hearing held here last week on complaints filed by employees of the Edgewater, N. Y., plant, Mr. Davis has stated that he will go on with the hearing in any event. It was also revealed that NRA is making a detailed investigation of the Edgewater complaints.

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for Automotive Industries

Although the level of general business last week remained above that a year ago, there was some slackening. The moderate recession is attributed to the severe storms that tied up transportation facilities and the beginning of the demobilization of the C.W.A. Industrial activity, however, continued to improve; and steel operations reached the highest level since last August.

Commodity Prices Rising

The Guaranty Trust Compasny' preliminary index of business activity for January stood at 65.8, as against 63.3 the month before and 55.2 a year ago. The company's index of wholesale commodity prices on Feb. 15 was 54.7, as against 51.9 a month earlier and 33.0 a year earlier.

Car Loadings Continue to Increase

Railway freight loadings during the week ended Feb. 17 totaled 258,049 cars, which marks an increase of 8406 cars above those during the preceding week, an increase of 67,841 cars above those a year ago, and an increase of 9713 cars above those two years ago.

Farm Income Improved

Gross farm income during 1933 amounted to $1,240,000,000, which marks an increase of about 24 per cent above that in 1932. The higher income was the result of better prices for farm products and the payments made by the Government for acreage reductions.

Power Production Up

Production of electricity by the electric light and power industry in the United States during the week ended Feb. 17 was 11.6 per cent above that in the corresponding period of last year.

Public Works Help Construction

Construction contracts awarded in 37 eastern States during January, according to the F. W. Dodge Corporation, amounted to $187,463,706, as against $83,356,000 in the corresponding month last year. The current total, however, is about 10 per cent smaller than that in December, 1933. A considerable part of the increase was the result of public works activity, for the total of this type of construction during January was 60 per cent larger than that reported for the entire quarter of last year.

Fisher's Index

Professor Fisher's index of wholesale commodity prices for the week ended Feb. 24 stood at 74.2, as against 73.7 the week before and 73.2 two weeks before.

Federal Reserve Statement

The consolidated statement of the Federal Reserve banks for the week ended Feb. 21 showed decreases of $2,000,000 in holdings of discounted bills and of $11,000,000 in holdings of bills bought in the open market. Holdings of Government securities remained unchanged.

New 450 Cu. In. G.M.T. Engine Develops 120 H.P.

PONTIAC—A new six-cylinder engine of 450 cu. in. displacement has been announced by General Motors Truck Co. and will be used in the Model T-84, a new truck in the 8-ton capacity range. Like other G.M.T. engines, it is of the valve-in-head type. It develops a maximum torque of 340 lb.-ft., the torque being practically constant over the speed range 800-1200 r.p.m., while the maximum horsepower of 120 is developed at 2300 r.p.m. Among the design features of this engine are airplane-type bearings with steel backs and a lining of copper-lead alloy; an oil-temperature regulator and a cleanable type of oil filter; a roller-bearing fan, a front-mounted centrifugal water pump, downdraft carburetor, tulip-type exhaust valves with stellite seats, and full-pressure lubrication with rifle-drilled connecting rods.

Knudsen Sees 1934 Wage Totals at 1929 Levels

FLINT, MICH.—Continuation of the present demand for cars during the balance of the year will make the 1934 earnings of automobile workers about the same as in 1929, W. S. Knudsen, General Motors executive vice-president, is reported to have told a closed meeting of the Flint Industrial Executives Club held this week. Accounts of the meeting credit Mr. Knudsen with saying that only about one per cent of the corporation's employees are receiving the code minimum of 43 cents per hour and that average hourly earnings are about 60 per cent above the minimum (roughly 69 cents per hr.).

Present demand for cars is better than at any time since 1929, Mr. Knudsen is reported to have said, present unfilled orders amounting to more than 60 days' production. He is also said to have emphasized that when the corporation signed the code, it was with the sincere intention of living up to it. As to the handling of increased costs, he said that the corporation was not taking any profit on them in establishing list prices.

Gordon Named APEM Counsel

DETROIT—Automotive Parts and Equipment Manufacturers, Inc., has appointed L. E. Gordon as legal counsel to the association and the Code Authority Committee. Mr. Gordon will spend his entire time on Association work and will be located at the Association's new headquarters, 800 Michigan Theatre Bldg., Detroit. Mr. Gordon has been engaged in special corporation law work for the past 15 years, with offices in Battle Creek, Mich.

Du Pont Buys Degreaser

WILMINGTON, DEL. — The du Pont company has announced the purchase of the metal degreasing business formerly conducted by the metal cleaning division of the Carrier Engineering Corporation. The transaction involves the sale of patents, trademarks and good will of the Carrier Vapor Degreaser machine and of the well-known solvent, "Cecolene," used in connection therewith. The R. & H. Chemicals Department of the du Pont company will continue to manufacture this product and supply it to the trade.

Houdaille Cuts Loss

DETROIT — Houdaille - Hershey Corporation and subsidiaries in 1933 sustained a net loss after taxes, depreciation, etc., of $113,900 against a deficit of $590,523 in 1932.

NRA 12-Point Program Forecasts Shorter Hours, More Pay and New Price Controls

Labor Federation Flays Automotive Industry at Public Hearings—Code Critics Charge Price Fixing—NRA Names Chairmen for Sessions of Code Authority Conference

WASHINGTON — Labor and opponents of code price controls were the most vigorous critics of NRA on the first two days of the public hearings which General Johnson is holding here this week to give everybody an opportunity to hurl their "dead-cats." Although criticism was invited, the opening session was launched with an address by General Johnson which, curiously enough, consisted mostly of a vigorous criticism of NRA's critics.

Extensive revisions in codes on a broad scale, including shorter hours and higher wages were forecast by the General in a 12-point program which NRA has developed as the result of its own studies and which will provide the principal points of discussion at the Code Authority Conference which opens on March 5. The 12 points follow:

1. A more uniform and equitable rule of national price stabilization in those cases where it is necessary to maintain wages at a decent standard against the certain results of predatory and cut-throat competition, and further insurance against increase of price faster and further than increase of purchasing power.
2. A more effective rule on costs for the purposes of maintaining rules against sales below costs of production.
3. Uniformity of wages and hourly rates in competitive industries.
4. Uniform classification of areas for the purpose of the North-South differentials.
5. Further reductions in hours per week and further increase in hourly wages.
6. Certainty of protection against monopoly control and oppression of small enterprise, and, especially, the inclusion in codes of adequate buying (as well as selling) provision to guard against oppression of small business.
7. A much improved method for securing prompt and effective compliance.
8. A safe method of financing code administration without racketeering and abuse.
9. Elimination of inconsistent or conflicting provisions among various codes.
10. Adequate labor and consumer representation in an advisory capacity on Code Authorities.
11. Uniformity of governmental representation on Code Authorities.
12. Wider use of mechanism for settling labor disputes in connection with Code Administration.

On the opening day, the labor policies of the automotive industry were bitterly attacked by William Collins, Detroit organizer for the American Federation of Labor. He was followed on the next day by Mrs. Gifford Pinchot, wife of the governor of Pennsylvania, who denounced NRA for delays in settling the Budd case.

Mr. Collins charged the industry with discrimination against union employees, exceeding the automobile code maximum of 48 hrs. per week, spying on workers' union activities, barring men over 40 years old, speeding up and juggling pay rates to circumvent the intent of the Recovery Act to increase wages, and other violations. He insisted that there should be a labor advisor on the code authority to cooperate with management. At the conclusion of his attack, General Johnson advised him to make a digest and submit the evidence to the National Compliance Director.

Frequent charges were made that business under the cover of the codes, was fixing prices, the criticism on this score being particularly vigorous governmental agencies. A charge of resale price maintenance was lodged by W. W. Humphrey of the Western Auto Supply Co. He said that an article which had cost 97 cents and had sold for $1.85, now cost his company $1.62 and that its manufacturer had said that if the article was not sold for $2.83, he would not supply any more.

S. M. Heimlich, who the Chilton Trade List indicates is head of the Heimlich Motor Co., Long Branch, N. J., Dodge dealer, appearing on his own behalf, requested an additional code to govern factory-dealer relations.

Next week's code conference will open on Monday at 11 A. M. with a general session in the Department of Commerce Auditorium, to be addressed by General Hugh S. Johnson, National Recovery Administrator. Thereafter, meetings will take place twice daily until each group has completed its discussions. The same officials and advisers who preside over the public meetings, will also have charge of the group meetings of the general code conference which will open Monday, March 5, in Constitution Hall with a speech by President Roosevelt.

The schedule of sessions, their locations and chairman are given in the table at the bottom of the page.

Session	Location	Chairmen
Employment	Dept. of Commerce Bldg.	R. W. Lea
Costs and Prices	Washington Hotel	W. A. Harriman and A. D. Whiteside
Production Control	Willard Hotel	R. H. Montgomery
Code Administration	Mayflower Hotel	D. R. Richberg and Alvin Brown
Small Business		A. W. Riley and Leon Henderson

McPherson on Hunt's Staff

DETROIT—Edward S. McPherson, for the past few years assistant chief engineer of the Hupp Motor Car Corp., has resigned and joined the staff of O. E. Hunt, vice-president in charge of engineering, General Motors Corp.

Production Briefs

Graham schedules 3000 for March and reports orders received since the first of the year at 3800 against 2400 in same period last year—Buick built 18,438 in February and has a big carry-over of orders into March—Dodge dealers delivered 3890 units in the week ended Feb. 17, a gain of 17 per cent over last year. In the first seven weeks of 1934, Dodge deliveries were 75 per cent ahead of 1933—Plymouth dealers delivered 4646 units in the week ended Feb. 24. Plymouth shipments in that week totaled 7558 bringing the total for the month to 23,907—DeSoto orders now on hand represent 40 per cent of volume of last year's 12-month volume—Hudson has 18,000 scheduled for March.

Chevrolet Adds Engineers

DETROIT—Several additions have recently been made to the Chevrolet engineering staff. Included are P. A. Collins, recently with Bendix Brake Co. and formerly with the Olds Motor Works, who is now in charge of experimental engineering at Chevrolet. R. S. Plexico, formerly with the Willys-Overland Company, has joined Chevrolet as special engineer on chassis units.

Bower Earnings Rise

DETROIT—Bower Roller Bearing Co., reports 1933 net profits of $246,698 after all charges including write-off of deposits in closed banks amounting to $30,347, against a net profit of $159,956 in the previous year. Current assets as of Dec. 31, 1933, including $416,302 cash, amounted to $1,245,633 and current liabilities were $200,033, compared with cash of $147,395, current assets of $893,985 and current liabilities of $124,521 on Dec. 31, 1932.

Chevrolet Names Johnson

DETROIT—L. W. Johnson, formerly assistant to the general auditor, Chevrolet Motor Co. in Detroit, has been named manager of parts distribution with Chevrolet and Flint. Mr. Johnson succeeds Lyman H. Parr, who retires after 16 years of service with the company.

John W. Bate

RACINE, WIS.—John W. Bate died at his winter home in St. Petersburg, Fla., Feb. 24, aged 70 years. He was founder and president of the Ajax Auto Parts Co. and the Rex Accessories Co., Racine. Mr. Bate began his career in the industry as chief engineer of the old Mitchell Motor Car Co., Racine, in 1907, and had a leading part in designing one of the first light 6-cyl. engines for that concern.

Sheet Steel Union Seen as Spearhead of Labor Drive on Open Shop Industries

WASHINGTON—At a time when the public is having its field day of "constructive criticism" of the NRA, at public hearings in Washington, the Amalgamated Association of Iron, Steel and Tin Workers is intensifying its drive to unionize the steel industry.

Even more significant, some industrialists look upon its activities as a forerunner of a new move by its parent body, the American Federation of Labor, to organize the existing open shop industries with especial concentration upon such major lines as the steel and automobile manufacturing units.

Already the association is trying to force to an early conclusion its controversy with the Weirton Steel Co. Although of the highest importance to industries generally, the association is not resting its case solely on the outcome of this dispute. Widening and making its campaign more impressive, it has laid protests before the National Labor Board with regard to elections in steel plants in the immediate Pittsburgh area. And more recently it was before the Board pressing charges against the Great Lakes Steel Corp., Ecorse, Mich.

Whether or not the association actually is a "spearhead" in an American Federation of Labor drive to enforce unionization of open shop industries, those who suspect such strategy, concede the moves are well conceived.

Despite the enormous gain in the Federation membership, its complete unionization of the bituminous coal industry and other outstanding achievements since the NRA was inaugurated, organized labor has found difficult going against the steel and automobile industries in particular and apparently feels if it can break in in these lines it will have a clear field as to the other important units of industry. The Amalgamated Association is the only organized labor unit in the steel industry. With it as a natural vehicle for unionizing the steel industry it is contended that it is in a potentially strategic position at this time, when by far the highest operations in the industry are in the departments—sheets, strip steel and tin plate—from which it draws its membership. Labor trouble in these departments not only would mean much to the steel industry but also to consumers of these products such as the automotive and cannery industries.

Finder of Big Diamond Buys Automobile First

If you found a 726 carat diamond what would you buy first?

J. J. Jonker, poor prospector who did find one recently, bought a brand new Studebaker.

According to reports, Mr. Jonker has refused $350,000 for his diamond and is waiting for a higher price. The diamond is the fourth largest in the world and is believed to be the lost half of the world famous Cullinan diamond.

Nealon Named Sales Mgr.

PORT HURON, MICH.—Frank A. Nealon has been appointed general sales manager of the American Enameled Magnet Wire Company of this city. He was formerly sales manager for the Sterling Cable Corporation. Both the American Enameled Magnet Wire Company and the Sterling Cable Corporation are Auto-Lite Divisions.

Frank A. Nealon

Labor Costs Rise Sharply As Result of NRA Program

NEW YORK—During the six-month period July to December, 1933, prices of finished manufactures rose 3.6 per cent, labor cost per man-hour, 27.7 per cent, labor cost per unit of product, 54.3 per cent, and labor cost in relation to manufacturers' gross income, 48.8 per cent, while, on the other hand, production declined 30.9 per cent according to computations of the National Industrial Conference Board, based on data of the United States Bureau of Labor Statistics and the Federal Reserve Board.

After March, 1933, production increased sharply until July, and prices rose in less degree. Labor cost per man-hour was somewhat less, and, aided by better plant utilization, labor cost per unit of product was reduced. After July production fell abruptly, and prices rose slightly. The higher wage rates imposed by government policy increased labor cost per man-hour. Curtailment of hours lessened the efficiency of plant operation, and introduction of new employees lowered the average efficiency of the working force. As a result, labor cost per unit of product increased, and labor cost in relation to manufacturers' gross income rose.

Smith Heads New MEMA Credit Governing Board

NEW YORK—R. L. Smith, Pyrene Manufacturing Co., has been named chairman of the recently organized Credit Governing Board of the Motor and Equipment Manufacturers Association. This board is made up entirely of member credit executives and is in full charge of the activities of the M.E.M.A. Credit Department. One of the first actions taken by this board was to make the services of the Credit Department available to non-member companies.

The association also announces the addition to the Board of Directors of C. H. Cuno, Cuno Engineering Corporation, and A. F. Strayer, USL Battery Corporation, as well as the personnel of the various standing committees.

Polk Puts January Sales at 84,000

DETROIT — Registrations of new cars and trucks in the United States in January are estimated at $84,000 according to R. L. Polk & Co. The estimate represents a loss of 8 per cent from January, 1933, when registrations totaled 91,554. The estimates are based on returns from 19 States.

The loss over last year is due entirely to the drop in passenger car sales inasmuch as the estimates put truck registrations for the month at 21,000, a gain of 71 per cent over last year. Due to production difficulties, however, passenger car sales show a loss of about 20 per cent, the totals for January, 1934 and 1933 being respectively 63,000 and 79,845.

Pyro-Action Spark Plugs

SPRINGFIELD, MASS. — United American Bosch Corporation has begun the manufacture of a new line of Pyro-Action Spark Plugs in its plant here under license from Robert Bosch, A.-G. The new plugs are identical in design, material, and methods of construction with the new line of Bosch spark plugs being manufactured at the Bosch plant in Stuttgart, Germany.

Flat Steel Market Is Wary on Commitments

Producers Fail to File Second Quarter Prices

NEW YORK—Fresh commitments in the flat steel market are being held up by the unwillingness of producers to add to their current backlog and the uncertainty surrounding second-quarter prices.

While for one reason or another, the date for filing price changes, so as to have them go into effect March 1, when ordinarily producers' books for second-quarter business would be opened, was permitted to pass, without any action being taken, this lapse from custom does not preclude a mark-up in prices, effective at a later day, but still early enough to cover a good slice of second-quarter shipments.

Code or no code, there is no law compelling producers to book orders when they don't want to. And just now many of them don't want any additional business.

The Code Authority has given official status to sheets, heretofore known in the trade as "Ford special" and now designated as hot-rolled, pickled in the breakdown, annealed and deoxidized, the listed base price being 2.65 cents, Pittsburgh, nominally $1 per ton lower than the market had been quoted at.

As the result of the recent avalanche of automotive specifications, the capacity of cold-finishers of both sheets and strip is engaged virtually 100 per cent, and just how much of this material will be on its way to consumers by the end of the month and how much buyers will still have coming to them then is problematical, although through their having put up the bars against tardy specifications, producers expect to be able to clean up all first-quarter specifications before the end of the month.

Newspaper reports that there is much uneasiness in steel circles over plans of certain automobile manufacturers to integrate their plants further through the addition of sheet rolling equipment, hardly reflect the sentiment of the large steel producers. The latter point out that the flexibility which the automotive industry must have in covering its steel requirements proclaims such a course as highly uneconomic. At peak demand, such rolling mills would be utterly inadequate to supply a worth while percentage and in off-periods they would prove an investment burden with obsolescence charges increased through idleness.

Pig Iron—Lake furnaces are shipping iron to automotive foundries at a rate approximately 40 per cent ahead of that of January, and yet nearly altogether made up of small lots, buyers being reluctant to take in more iron than they will need for the current month's melt. Prices remain unchanged.

Aluminum—While some secondary specialists are asking as high as 17½c. for No. 12 alloy, automotive consumers show little interest in offerings at so high levels and apparently have sufficient metal on hand to carry them for some time.

Copper—The hearing on the copper code has been deferred to March 9. Meanwhile the market is marking time at the unchanged price level of 8c., delivered Connecticut Valley point.

Tin—Straits tin was offered at 52¼c. at the beginning of the week, the market having eased off slightly.

Lead—Fairly active and unchanged.

Zinc—Quiet and unchanged.

New Federal at $645

DETROIT—Federal Motor Truck Co. has announced a new Model 15X six-cylinder 1½-ton truck which differs from the Model 15 truck of the Federal line principally in that radiator shell and bumpers, etc., are painted instead of being chromium-plated. The 15X chassis sells at $645, the lowest price in the history of the Federal company. With dual rear tires the gross weight rating is 10,000 lb.

Fleet Discounts on Gas Limited by New Contract

Maximum Margin Allowed Commercial Consumers Is 2 Cents Off Tank Wagon

WASHINGTON—A new standard contract establishing discounts to commercial consumers of gasoline has been made effective by Oil Code Administrator Ickes. On gasoline of 60 octane rating or above, the new contract permits a discount of one cent per gallon from tank wagon price on purchases from three to ten thousand gallons per month; on purchases of over ten thousand gallons per month a discount of two cents per gallon from tank wagon is permitted. On purchases of gasoline of less than 60 octane rating, the foregoing discounts are halved.

In determining eligibility for discounts, purchases of fuels of more and less than 60 octane rating are considered separately. The differential between tank wagon and retail price must not exceed two cents per gallon except where a larger differential is necessary to meet the lower prices of a competitor. These discounts apply only on single deliveries of 100 gallons or more made from tank wagon or bulk storage. On smaller deliveries, retail prices apply.

Discounts will be payable within 25 days from the end of the month in which deliveries are made. If, at the end of the annual contract period, the total quantities purchased and delivered during such period, divided by twelve, entitle the purchaser to a larger discount than was actually received, the difference may be remitted.

Regional marketing committees may upon a three-fourths vote establish larger discounts for purchases in excess of 25,000 gallons per month. So that commercial consumers may not attempt to qualify for retailer's discounts, a retailer has been defined as one who resells not less than 85 per cent of the gasoline he buys.

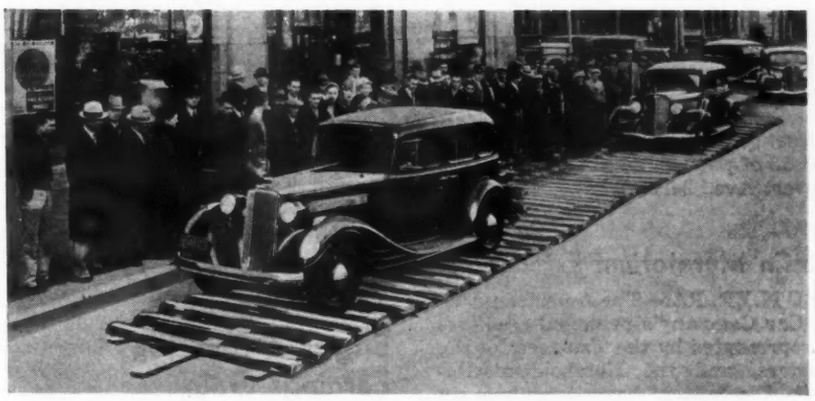
Commercial contracts made since August 19, 1933, which allow discounts on a quantity basis, and all consumer contracts made since that date at flat prices or with top price provisions, have been declared null and void by the administrator.

According to American Trucking Associations, Inc., the discounts allowed on the new contract are considerable lower than those heretofore given to large commercial users.

Eaton Gets Citroen Order

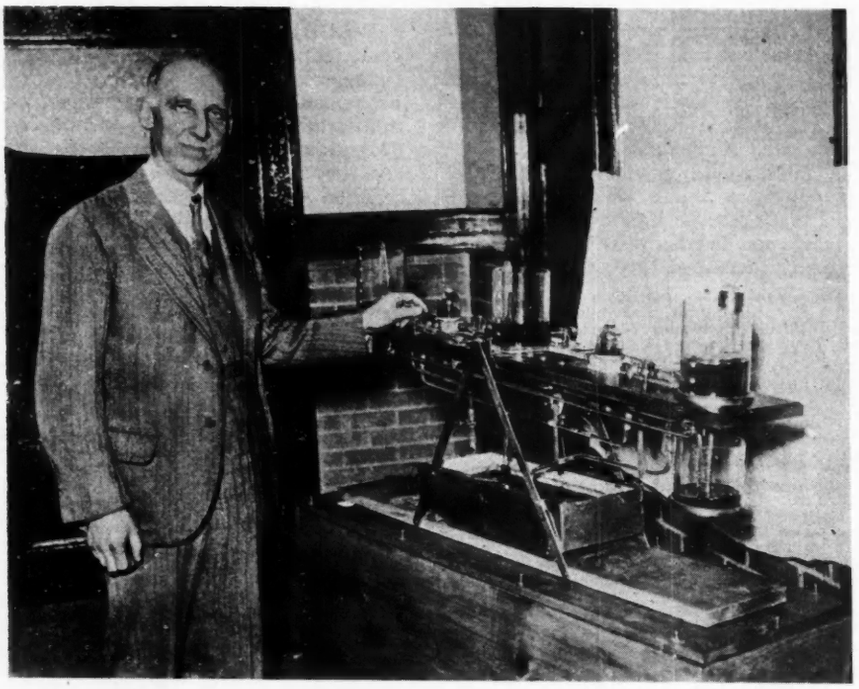
CLEVELAND—A large production order of valve seat inserts has been received by the Eaton Mfg. Co., through its Wilcox-Rich division, from the Citroen Motor Works, Paris, says C. W. Miller, president of the division. The inserts are for both passenger cars and trucks.

Pontiac Dealer Has Own Knee-Action Road



Like the tap dancers who used to spread a special floor on the stage, the Lincoln, Neb., Pontiac dealer lays down a special knee action test road in front of his salesroom

Dr. Dickinson Builds Economonstrator to Explain Theory of "Econo-Dynamics"



Dr. Dickinson and the Economonstrator

The Economonstrator, an ingenious device developed by Dr. H. C. Dickinson, to illustrate graphically his economic theories which he first presented to the automotive industry at the 1933 Annual Meeting of the S.A.E. Dr. Dickinson, as everyone knows, is chief of the heat and power division of the Bureau of Standards and in 1933 was president of the S.A.E.

Our Washington representative explains the operation of the Economonstrator as follows:

Showing the circulation of wealth, from a bottom tank which represents natural resources, the liquid, illustrating money and credit, is pumped into the system. The amount of this wealth first appears in the container which is mounted on left pan of the balance, the container indicating the net income or standard of living of the nation. As the standard of living level is raised a surplus of wealth is available. The surplus is pumped into two containers. One is non-productive wealth—personal property—and the other is productive wealth—stocks and bonds. The container for non-productive wealth is directly over the pivot while the productive wealth container is on the right pan of the balance. Below the productive wealth container is a second container illustrating the annual fixed interest charges.

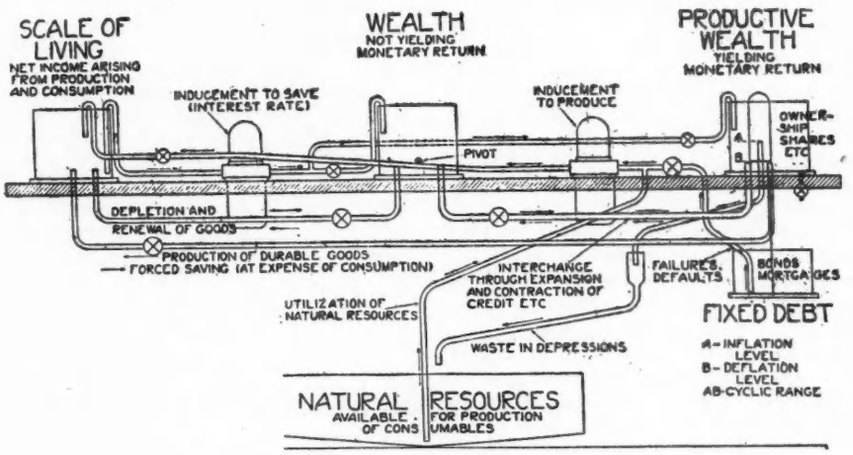
The liquid representing wealth is pumped through these containers which are connected by glass tubes and valves in the same manner in which wealth. Dr. Dickinson says, circulates and accumulates in our economic system.

When the nation is prosperous, the balance is in a level position, with the standard of living or net income of the nation balancing the total of productive wealth and annual fixed interest charges.

Dr. Dickinson says that unfortunately the prosperous equilibrium is not maintained because a surplus of savings will cause an inflation of stock and bond values. Arising from the inflation is an increase in fixed indebtedness and consequently an increase in annual interest charges. Depression follows with interest charges loaded on business and impeding a return of prosperity.

From this, Dr. Dickinson says, is illustrated the principal conclusion of his theory which he calls "econo-dynamics," that hard times are always indicated when the total payment of fixed interest charges is more than approximately 5 per cent of the total net income of the nation. The first step toward recovery therefore is held to be the reestablishment as nearly as possible of the favorable ratio between interest and net income.

Schematic diagram of the Dickinson Economonstrator



Motor Wheel Nets $122,168

LANSING, MICH.—Motor Wheel Corp. reports 1933 net profit of $122,168 after depreciation, etc., compared with net loss of $1,186,751 for the previous year. Current assets as of Dec. 31, 1933, were $3,175,390 and current liabilities, $1,365,636.

David R. Swinton

DETROIT — David R. Swinton, sales manager for the Eaton Manufacturing Company of Cleveland, died Feb. 23 of pneumonia at his home, 1939 Calvert Ave., here.

Austin Moratorium Extended

BUTLER, PA.—The American Austin Car Company's principal creditors as represented by the Trustees for the Vendors, and the Noteholders' Deposit Committee have unanimously extended the moratorium date from March 31, 1934, to March 31, 1935, according to an announcement by R. O. Gill, president.

Campbell, Wyant Earns $40,335

CHICAGO — Campbell, Wyant & Cannon Foundry Co. earned $40,335 in 1933 after all charges which compares with a net loss of $313,409 in 1932.

Briggs & Stratton Earnings Gain

CHICAGO—Earnings of the Briggs & Stratton Corp. in 1933 amounted to $252,067. This compares with net income of $30,689 in the previous year.

335,000 Output For March

week. Mr. Knudsen stated that hourly wages at present in General Motors were virtually the same as in 1929 and that if the 48-hr. maximum hours under the code are permitted, wages per worker will total close to the 1929 level.

It is too early yet to estimate retail sales for February, but early returns indicate that sales are way in excess of the same period last year in spite of prevailing bad weather. Surprisingly much of the increase is coming from the smaller communities apparently. In many small towns dealers have sold more cars than during the entire year of 1931.

Individual production estimates for March include 18,000 for Pontiac as against 11,000 in February, 8,800 for Buick against 8,500 in February and 18,000 for Hudson-Essex in March.

Federal Mogul Reports

DETROIT—Federal Mogul Corporation reports net profit after taxes and other charges of $61,606 which contrasts with a net loss of $149,868 in 1932.

McCord Nets $24,757

DETROIT—McCord Radiator & Mfg. Co., reports net profit in 1933 of $24,757 after depreciation, interest, etc., contrasted with a net loss for 1932 totaling $649,109. Current assets as of Dec. 31, 1933, amounted to $1,193,658 and current liabilities $383,771 against $860,014 and $257,749 respectively on Dec. 31, 1932.

Gabriel Reports Loss

CLEVELAND — Gabriel Company reports net loss after charges of $130,620 for 1933 against a loss of $107,938 in the previous year.

Truck Selling Code

(*Continued from page 286*)

manufacturers of truck replacement parts, be required to meet the following:

"So long as the maker of any trademarked truck (or his successor in business) continues to make and supply repair parts therefor, it shall be an unfair method of competition for any other person to make and supply repair parts for such trucks, unless (a) the name of the maker of such repair part is plainly marked on such part (or if this is impractical, then on the package or tag); unless (b) said parts are otherwise marked, packaged or sold without imitating labels and in such a manner as to show clearly to the ultimate user that they are not made by the maker of the original truck."

Different depreciation sales for use in determining maximum used truck allowances are set for each of six truck price classes, the original delivered price of the complete truck being used as the basis of classification and the figure to which the depreciation percentages are applied. The depreciation scales follow:

When the price, as defined above, is not more than $700, deduct depreciation at the rate of:
5% per month for the first six months
4% per month for the next six months
3% per month for the next six months
2% per month for the next six months
1% per month for the next six months
Trade-in value after 2½ years not over 10%.

From $701 to $1,000.
5% per month for the first six months
4% per month for the next six months
3% per month for the next six months
1% per month for the next six months
1% per month for the next six months
1% per month for the next six months
Trade-in value after 3 years not over 10%.

From $1,001 to $1,800.
5% per month for the first six months
3% per month for the next six months
2% per month for the next six months
2% per month for the next six months
1% per month for the next six months
1% per month for the next six months
1% per month for the next six months
Trade-in value after 3½ years not over 10%.

From $1,801 to $2,500.
5% per month for the first six months
3% per month for the next six months
2% per month for the next six months
1% per month for the next six months
1% per month for the next six months
1% per month for the next six months
1% per month for the next six months
1% per month for the next six months
Trade-in value after 4 years not over 10%.

From $2,501 to $3,500.
5% per month for the first six months
3% per month for the next six months
1% per month for the next six months
1% per month for the next six months
1% per month for the next six months
1% per month for the next six months
1% per month for the next six months
1% per month for the next six months
1% per month for the next six months
Trade-in value after 4½ years not over 10%.

Over $3,500.
5% per month for the first six months
2% per month for the next six months
1% per month for the next six months
1% per month for the next six months
1% per month for the next six months
1% per month for the next six months
1% per month for the next six months
1% per month for the next six months
1% per month for the next six months
1% per month for the next six months
Trade-in value after 5 years not over 10%.

Tests Measure Noise Reduction with "Spoked" Laminated Timing Gears

(*Continued from page 281*)

other hand, does not have any pronounced peak on its sound curve, due to the broken web line.

One of the characteristics of phenolic laminated material is its resiliency, when designed properly for gears. When first introduced and used in its sheet form with uniform thickness of web throughout, a gear that stood 15,000 car miles was considered very good. Advancement in molding technic produced the shaped web with added resiliency in both planes and field tests of 25,000 car miles showed this gear still in good condition. The development of the spoke gear increased the resiliency in the plane of the rotation, but maintained its strength at right angle to its plane of rotation, thus increasing gear life, approximately 50 per cent.

Static web deflections were made to learn the best spoke design. In making this test, the gear is supported by its rim on a rigid base (Fig. 3), pressure being applied to the hub in the direction of the gear axis.

The following table is the result of a comparative web deflection test conducted on solid web and spoke gears designed for the same motor.

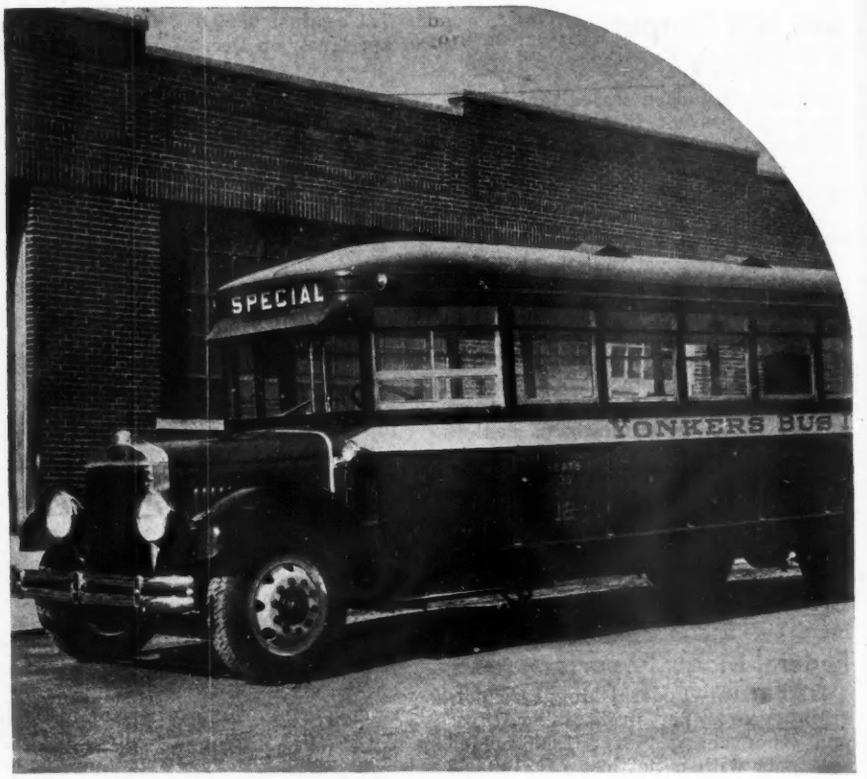
The silent gear, through its helical angle, develops a side thrust load of 450 lb. when running full speed, full load. The loads where these gears fractured on side deflection were 4400 lb. for the solid web and 4000 lb. for the spoke gear. This indicates a safety factor of 9.

These gears were also dynamically tested in the motor for which they were designed. The motor was operated without harmonic balancer to produce the worst condition possible. The spoke gear successfully withstood this test until the motor bearings were burned out. The solid web gear, on the other hand, could not resist this shock.

Static Lateral Deflection Test

Load	Deflection Solid Web Gear	Deflection Spoke Gear
900	.014	.0185
1000	.016	.020
1200	.0185	.0235
1400	.022	.027
1600	.025	.030
1800	.028	.0345
2000	.0315	.038

SKF EQUIPPED
BUILT BY
MACK TRUCKS, INC.



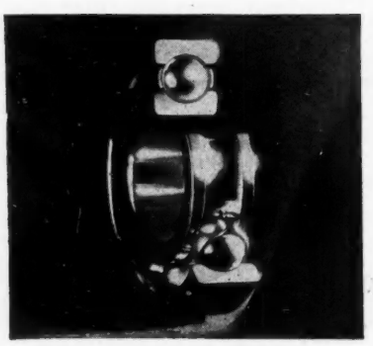
ECONOMY GOES HAND IN HAND WITH SKF

▼ ▼ ▼ DEPENDABILITY

"Ample power to maintain the most difficult schedule with a *startling economy of operation,*" says Mack of their Model BC six-cylinder bus for city service. The italics are ours because SKF Bearings have an important job on this bus. They certainly play a part in keeping the power plant at its highest efficiency with the lowest cost per bearing mile.

On many vital bearing locations of this Mack bus, SKF's assure smooth performance throughout a long life. There's no need of bearing adjustments . . . and that means uniform efficiency of inter-related parts. SKF ruggedness is ample security for hard service and uninterrupted schedules in hundreds of thousands of miles.

●You may buy a bearing as a bargain but try and get a bargain out of using it, for nothing is apt to cost so much as a bearing that cost so little



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SKF INDUSTRIES, INC., FRONT ST. and ERIE AVE., PHILADELPHIA, PA.

SKF
Ball and Roller Bearings